THE

Practical Teacher

A MONTHLY EDUCATIONAL JOURNAL.

Edited by JOSEPH HUGHES.

'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

VOL. X. NO. 10. DECEMBER, 1890. PRICE, 6D. POST FREE, 7½D.

Honours Hygiene.

BY

ARTHUR NEWSHOLME, M.D., D.P.H. UNIV. LOND.,

Medical Officer of Health for Brighton.

OFFENSIVE TRADES.

IT will be convenient first to state the legal enactments bearing on this question. By sect. 112 of the Public Health Act, any person who, after the passing of this Act, establishes within the district of an urban sanitary authority, without their consent in writing, any offensive trade; that is to say, the trade of—

Blood boiler, or
Bone boiler, or
Fellmonger, or
Soap boiler, or
Tallow melter, or
Tripe boiler, or
any other noxious or offensive trade, business, or manufacture,

shall be liable to a penalty not exceeding fifty pounds in respect of the establishment thereof, and a penalty not exceeding forty shillings for every day on which the offence is continued.

These provisions cannot be enforced in rural districts without the assistance of the Local Government Board.

The 'other noxious or offensive trades,' in order to be brought within the operation of the section, must be analogous to those which are specially enumerated. Thus in the case of a business of *frying fish* for sale by retail, the quarter sessions, on appeal against a conviction, found that the business, as carried on by the respondent, was an offensive trade; but were of opinion that fish-frying was not a trade which was either specified in the section, or covered by the general words, 'other noxious,' &c. They therefore quashed the conviction. This conclusion was confirmed on further appeal.

The most exhaustive and authoritative report on this subject is by Dr. Ballard, F.R.S., a medical inspector of the Local Government Board, and a large portion of the information given hereafter is derived from this report.

We may consider (1) the extent to which the public is inconvenienced by various effluvium nuisances. Most of them arise from trade processes in which animal matters are chiefly used. Perhaps the most disgusting are the effluvia from gut-scraping, and the preparation of sausage skins and catgut, the preparation of artificial manures from 'skutch' (the refuse matter of the manufacture of glue), the manufacture of some kinds of artificial manures, and the melting of some kinds of fat. Manufacturing businesses dealing with vegetable substances are often offensive, but rarely give out disgusting effluvia. The most offensive vegetable effluvia are probably those thrown off during the heating of vegetable oils, as in the boiling of linseed oil, the manufacture of palmitic acid from cotton oil or palm oil, the manufacture of some kinds of varnish, the drying of fabrics coated with such varnishes, and the burning of painted articles, such as disused meat-tins.

Occasionally offensive effluvia arise in connection with industries in which neither vegetable nor animal matters are used; as in the manufacture of sulphate or chloride of ammonia, and some other processes in which sulphuretted hydrogen is copiously evolved, and in the making of gas and the distillation of tar. The fumes from the manufacture of alkali and bleaching powder are acid and irritating, and produce very injurious effects on vegetation in the neighbourhood.

The distances to which nuisances extend vary greatly according to circumstances—as, for instance, the elevation at which the effluvia are discharged into the air. Discharge from a high chimney often relieves the immediate vicinity of the works at the expense of those living at a greater distance. With a damp and comparatively stagnant atmosphere, effluvia have a much greater tendency to cling about a neighbourhood.

BRITISH MUSEUM

(2) The industrial processes in which offensive effluvia are produced are classified by Dr. Ballard as follows :—

1. The keeping of animals.
2. The slaughtering of animals.
3. Other branches of industry in which animal matters or substances of animal origin are chiefly dealt with.
4. Branches of industry in which vegetable matters are chiefly dealt with.
5. Branches of industry in which mineral matters are chiefly dealt with.
6. Branches of industry in which matters of mixed origin (animal, vegetable, and mineral) are dealt with.

(3) It is important to inquire to what extent offensive trade effluvia are injurious to the public health. It is impossible to bring statistics to bear on the inquiry, as other influences, apart from occupation, can scarcely be eliminated. The term 'injurious to health' is capable of a double interpretation. It might mean either serious damage to health, or the mere production of bodily discomfort or other functional disturbance by the offensive effluvia, leading by its continuance to an appreciable impairment of vigour, though not to any actual disease.

It can scarcely be denied that in the latter sense offensive effluvia have a deleterious effect on health. Such symptoms as loss of appetite, nausea, headache, occasionally diarrhœa, and general malaise are produced by effluvia of various kinds, but which are all offensive. 'A condition of *dis*-ease or *mal*-aise is produced.'

There is little difficulty in proving bad effects on the workmen, though the invariable defence of manufacturers is an appeal to the condition of health of their workmen. It is notorious that the workmen only remain such so long as they are healthy, and that as they become disabled they necessarily cease to rank among workmen. The decomposition of putrefying organic matters is unquestionably dangerous. The general doctrine of sanitation that filth is one of the chief factors in producing disease is certainly applicable to trade effluvia as well as to general sanitation. It has been alleged on behalf of such effluvia as chlorine, sulphurous acid and tar vapours that they are useful disinfectants; but it has been clearly proved by modern research that disinfectants, in order to be of practical use, must be in such a concentrated condition that the air containing them is irrespirable. Such septic dieases as erysipelas, and possibly also diphtheria, are probably favoured by organic trade effluvia.

(4) The means available to prevent or minimise the nuisances arising from trade effluvia vary with the character of the processes. The general principles on which treatment must be founded depend, as Dr. Ballard points out, on a recognition of the following kinds of effluvia :—

1. Effluvia dependent on the accumulation of filth on or about business premises, or on its removal in an offensive condition.
2. On a generally filthy condition of the interior of buildings and premises and utensils generally.
3. On an improper mode of disposing of offensive refuse, liquid or otherwise.
4. On insufficient or careless arrangements in reception of offensive materials of the trade, or in removal of offensive products.
5. On an improper mode of storing offensive materials or products.
6. On the escape of offensive gases or vapours given off during some part of the trade processes.

It is evident that under the first two headings the proper remedy is cleanliness. Filth should be removed in impervious covered vessels, at regular intervals. Structural arrangements should be made, which will facilitate cleansing operations. Solid refuse should, as far as possible, be separated from liquid refuse, as thus putrefaction is retarded.

Under the last head important remedies are applicable. In many cases a careful selection of the materials of manufacture will form an effective remedy. Thus much of the nuisance connected with soap or candle works arises from the putrid condition of the fat collected from butchers and marine store dealers, and might be obviated by more regular and more frequent collection of the materials of manufacture. The offensive vapours arising during processes of manufacture may be intercepted before reaching the external air, and so treated that they lose their obnoxious character. Various methods of interception are adopted, according to the processes involved. Occasionally it is necessary to have the air of the entire workshop drawn by means of artificial ventilation through a fire; usually the interception of air from special chambers suffices. When thus collected the offensive air may be dealt with by (1) passing it through water or some other liquid capable of absorbing the offensive materials; or (2) passing it through some powder with which it has chemical affinity; or (3) if its offensive materials are capable of condensation by cold, passing them through an appropriate condensing apparatus; or (4) if the evolved matters are organic in nature, conducting them through a fire. (5) Occasionally it is sufficient to discharge the offensive gases into the air from a high chimney; and this always produces a mitigation of nuisance, as compared with discharge at a low level.

It is usually found that the adoption of one or other of these methods is directly or indirectly profitable.

(To be continued.)

—o—

Tests in Mental Arithmetic.

STANDARD I.

1. How many less than 30 is 3 times 8? 6.
2. What is the sum of 4 times 9 and 5 times 4? 56.
3. What must be added to 56 to make one hundred? 44.
4. How much are 44 farthings? 11d.
5. Take 11d. from a florin. 1s. 1d.

6. What is the half of that? 6½d.
7. What is the half of that? 3¼d.
8. How much more is wanted to make 6d.? 2¾d.
9. To how many boys could I give 4d. each out of a florin? 6.
10. To how many could I give 3d. each? 8.
11. How many pence are there in a florin? 24.
12. How many are there in a double florin? 48.

STANDARD II.

1. Add 7 times 4 and 6 times 7. 70.
2. What is the half of that? 35.
3. How many pence must be paid for 6 boxes each costing a florin? 144.
4. What is a quarter of that? 36.
5. What would be the cost of two score and two dozen penny stamps? 5s. 4d.
6. What change would be given out of three florins? 8d.
7. How many articles at 8d. each could you get for a double florin? 6.
8. What would a railway journey of 90 miles cost at a penny a mile? 7s. 6d.
9. What would half a ticket cost? 3s. 9d.
10. What would be the cost of both tickets? 11s. 3d.
11. How long would the journey take at 20 miles an hour? 4½ hours.
12. How long would it take at 40 miles an hour? 2¼ hours.

STANDARD III.

1. How many threepences could you get for 3 half-crowns? 30.
2. Divide a florin amongst 16 girls; how much is that for each? 1½d.
3. What is the cost of 15 dozen marbles at 6 for ½d.? 1s. 3d.
4. What change would be received out of a crown? 3s. 9d.
5. How many halfpennies could you get for that sum? 90.
6. How many ounces are there in 2½ lbs. of coffee? 40.
7. What would 2½ lbs. of coffee cost at 2d. an ounce? 6s. 8d.
8. How many inches are there in ¾ yard of silk? 27.
9. What would ¾ yard of silk cost at 10s. a yard? 7s. 6d.
10. How much could you get for £1 5s.? 2½ yards.
11. What will a stone of apples cost at 4d. a lb.? 4s. 8d.
12. What quantity could you get for 1s. 6d.? 4½ lbs.

STANDARD IV.

1. How many lbs. of tea at 2s. 8d. could you get for 8s.? 3.
2. What quantity could you get for 8d.? ¼ lb.
3. What quantity could you get for a penny? ½ oz.
4. If 8 books cost a florin, what will 7 cost? 1s. 9d.
5. How many eggs could you get for a florin at 5 for 3d.? 40.
6. How much would 90 cost? 4s. 6d.
7. What will 300 articles cost at 3d. each? £3 15s.
8. What would they cost at 4d. each? £5.
9. What is ½ of a third of a sovereign? 3s. 4d.
10. How many pounds are there in ¼ of a ton? 448.
11. What is the cost of a gallon of beer at 1½d. per half-pint? 2s.
12. What quantity could you get for a crown? 2½ gallons.

STANDARD V.

1. Take ¼ + ⅛ from 1. ⅝.
2. If a boy ate ⅓ and then ⅔ of a cake, what part would he have eaten? 11/15.
3. What part would have been left? 4/15.
4. What is the cost of 3,000 balls at 1½d. each? £18 15s.
5. What would they cost at 4½d. each? £56 5s.
6. If 20 men can reap a field in 6 days, how long will it take 30 men? 4 days.
7. If a servant's wages are £15 a year, what should she receive for 219 days? £9.
8. How many times is ⅝ of a shilling contained in a crown? 6.
9. Take 7/100 from ·1. ·03.
10. Multiply ·03 by 90. 2·7.
11. Divide ·03 by 6. ·005.
12. What will £650 amount to in 4 years at 4 per cent? £754.

STANDARDS VI. AND VII.

1. What is the L. C. M. of 1, 2, 3, 4, 5, 6? 60.
2. Divide ⅝ of 12 by 15. ⅔.
3. Reduce ¾ of a shilling to the decimal of half-a-crown. ·3.
4. Divide ·3 by 90. ·003̇.
5. If the boys in a school are to the girls as 5 : 4, how many boys are there in a mixed school of 360 children? 200.
6. What would be the ratio, if the number of boys was 280? 7 : 2.
7. If ⅝ of the price of a watch is £3 10s., what is the price of the watch? £5 12s.
8. What principal will gain £72 in 4 years at 3 per cent.? £600.
9. If an article costing £1 5s. be sold at a gain of 30 per cent., what is the selling price? £1 12s. 6d.
10. If an article be sold for £2 12s. at a gain of 30 per cent., what is the cost price? £2.
11. How much stock can be bought for £6,000 in the 3 per cents. at 75? £8,000.
12. What must be the price of the 5 per cents. to get 4 per cent. for my money? £125.

An Elementary Course in the Use of Wood Working Tools.

BY FRED. WILKINSON, F.G.S.,

Science Teacher under the Bolton School Board.

HAVING cut away the wood required, we must see that the end is square with the face side. If not, we must use the chisel until this is so.

Exercise XXI.

We shall next describe the process of sand papering this cut end. A glance at the piece of wood we are working, shows us which way the grain of it runs. A knowledge of this is important in the operation of sand-papering.

If we refer to fig. 100, we find the end of the wood round, and a thick line running down the centre of the upper face.

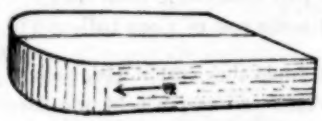


Fig. 100.

This line roughly, say, divides the block into two halves.

Take a piece of cork about 3 in. by 2 in. and an inch thick. Cut a piece of sand paper, medium quality, and cover the cork by wrapping the sand paper round the cork once, leaving the ends open.

Let us refer again to the diagram. The arrow indicates the direction *with* the grain. Now it is clear that if we apply the sand paper in the direction of the arrow, we are simply causing the fibres which end in the rounded section to lie in the direction of the rubbing. But if we take the remote half, we cause an opposite effect. Instead of causing the ends of the fibres to lie down we cut them off clean, because the sand-paper is acting *against* the fibres and not *with* them.

Let it be remembered therefore, always, that the pupils observe the direction of grain and sand-paper accordingly. If this rule be adopted, a much better finish is given to the sand-papered surface.

Exercise XXII.

Take a block 6 in. by 4 in. by 1½ in., and let it be trued up properly. Now run a gauge line, at a distance of one inch from the upper surface, on all the four edges. On the upper face also draw over two lines at a distance of 2 in. from each, end and draw these two lines over to meet the line which passes all round. The block when ready for sawing will be like fig. 101.

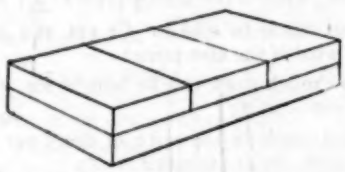


Fig. 101.

Now place bench-hook and wood in position ready for sawing, and with the tenon saw cut down to gauge lines, and be careful not to go below. Next fix the block in the vice with the upper surface as shown in fig. 102.

Take the chisel firmly in the right hand and place the left elbow upon the bench. The fore-finger of the right hand should rest on the back of the chisel, and the left hand should be placed also on the back to guide it.

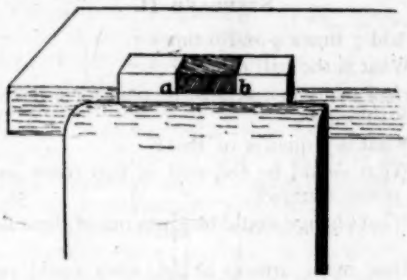


Fig. 102.

We are required to take away the part shaded in fig. 102. Holding the chisel in a horizontal direction we apply the cutting edge of it to the top edges of the piece to be removed and work gradually down to points A and B so as to leave a triangular mass in the middle. See fig. 103.

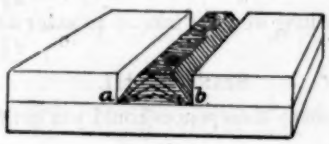


Fig. 103.

Gradually work down to line A B as shown in the figure, making the mass smaller and smaller until a level and true cutting is obtained.

Exercise XXIII.

Our next exercise will be very similar to cutting a mortise, and after this exercise we shall apply our knowledge to the construction of a T square and try square.

Take a block exactly of same size as before—6 in. × 4 in. × 1½ in., and gange a line round the right end at a distance of 1½ in. from the end on all four sides. Also, at distances of 1½ in., draw two lines from this, and continue the two lines over the end and on to the under side, as shown in fig. 104.

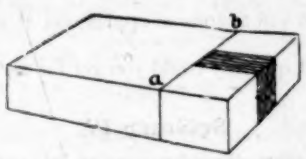


Fig. 104.

We are required in this exercise to take out the piece shaded in fig. 104. Place the block in the vice, as we did in Exercise XIII., fig. 65, and saw down to lines.

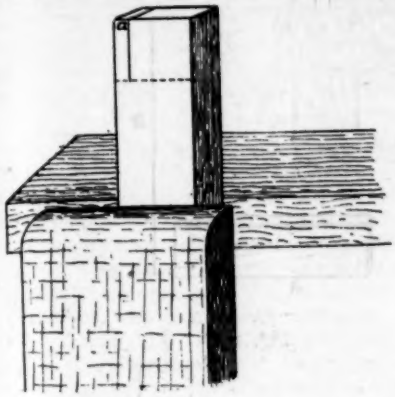


Fig. 65.

In the next process we shall require the aid of a clamp to fasten down the block to the bench, and, as these are common, little difficulty will be experienced in obtaining one. Lay block on the bench and take the precaution of having a piece of wood underneath to prevent marking of the bench, and fasten down. We propose next to use the chisel to remove the portion required.

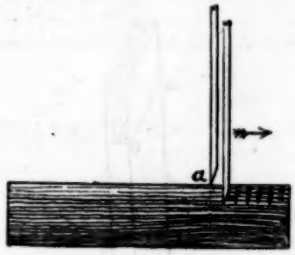


Fig. 105.

Place the chisel with the cutting edge parallel to the line at fig. 104, but at a little distance from it—say $\frac{1}{16}$ in. Also, have the chisel perpendicular (see fig. 105) which gives us a section of the block we are working on. Be careful to have the front of the chisel next the line. When the blow is struck with the mallet, the cutting edge and grinding force their way into the wood, and there must be a squeezing up of the matter in front of the grinding to make way for it. The nature of the front of chisel prevents any great amount of pressure being exerted at right angles to it. So the cut on the front side will be perpendicular, but not quite perpendicular, on the grinding side. Now cut a series of perpendicular cuts in the direction of the arrow, taking care to keep inside the working lines. Now drive the chisel in, exactly over the line at point *a*, as shown in fig. 105, and take care to maintain a perpendicular position. If not, the cutting will be bad. Now turn over the wood and go through the same operations, so that when finished we have an object similar to fig. 106.

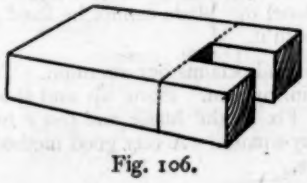


Fig. 106.

Exercise XXIV.

TO MAKE A T-SQUARE: See fig. 107.

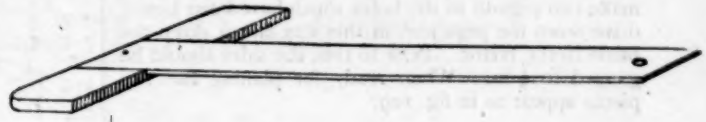


Fig. 107.

In the construction of this object we shall apply the exercises we have already gone over, with one exception, and we propose next to work this one and then set up the square.

Take a piece of some fancy wood—either beech, pear, or walnut—in length 2 feet, width $2\frac{1}{4}$ in., and $\frac{1}{4}$ in. thick. We first must plane this down on one side, and see that this face is perfectly true. Then true the two sides with this first side, and next proceed to bore a hole in the end according to position indicated. The width of the lath is to be 2 in., and so we must gauge to two inches wide and plane down. Next draw a line at the end at a distance of 3 in. from it, and one at 1 in. from it, and draw diagonals as shewn in fig. 108.

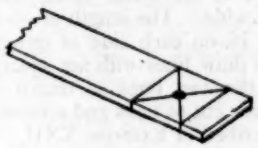


Fig. 108.

We leave an inch over for a purpose we shall now explain. Before, however, we do so we obtain a centre-bit $\frac{1}{2}$ in. and brace, and bore a hole through the wood, putting point of bit over the intersection of the diagonals.

In boring, it is wise to have some rough piece of wood underneath to prevent splintering. If this cannot be obtained turn the wood, through which we are boring, over, when the point of the centre bit is through, and bore in the opposite direction. This will prevent splintering which often gives the work an unsightly look.

Having finished the boring we now proceed to plane down the blade to the right thickness. This we want not thicker than $\frac{1}{8}$ in. The piece we have is $\frac{1}{4}$ in. thick, so that we have to remove $\frac{1}{8}$ in. by planing. But we have a difficulty now presented which we have not had before, viz., planing a very thin strip. To hold this on the bench is a difficult matter; to attempt to fasten it down to the bench, dangerous. We therefore adopt the method of pegging the piece down on to another level board and planing over both the pegs and the piece we want for the blade.

We see now why we left about an inch at the end, viz., that we might drive in a peg, and when the piece is sufficiently thin, cut off this end and so have a perfect finish to the blade.

The method of pegging is accomplished as follows: Place the wood upon a level board and at each end bore a hole about $\frac{3}{16}$ in. or $\frac{1}{4}$ in. and continue the boring into lower piece for a short distance. Now make two pegs to fit the holes which have been bored, drive down the pegs, and in this way fasten down the blade to the board. Prior to this, the sides should be gauged to $\frac{1}{8}$ in. When ready for planing the two pieces appear as in fig. 109.

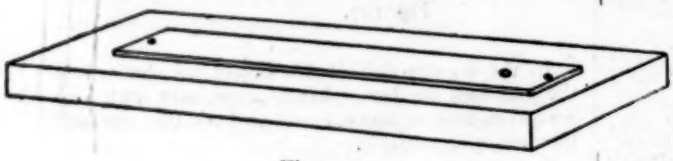


Fig. 109.

Plane down to gauge lines. Then cut off one inch from the end with the hole in and measure 20 in. and cut off. Shoot both ends next and the piece is now ready for fixing into stock or head of square.

For this we want a piece of wood when finished to 7 in. × 2 in. × $\frac{1}{2}$ in. Let it be of same kind as blade.

Plane down one side and one edge, then gauge to $\frac{1}{2}$ in. and plane down and lastly gauge to 2 in. wide and finish. We now require a trench cutting in $\frac{1}{8}$ in. deep to allow of the blade fitting into it, and this must be 2 in. wide. The length of stock is 7 in.; this will leave $2\frac{1}{2}$ in. on each side of trench. Gauge to this width, or draw lines with set square and gauge $\frac{1}{8}$ in. between the two lines so drawn on the edges. With tenon saw cut to lines and remove carefully with chisel as described in Exercise XXII.

Fit in the blade carefully, and when seen in section we have result shown in fig. 110.

Fig. 110.

Before fastening in the blade, we now round the two corners as shown in fig. 107.

We proceed as follows:—

Take the head and draw two squares of 1 in. side, as shown in fig. 111, which is a plan of the stock of T-square.

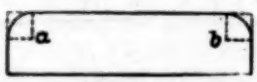


Fig. 111.

With compass draw two quadrants as shown, and pare off as described in Exercise XX.

Now sand paper the rounded corners and screw down the blade by 3 $\frac{1}{4}$-in. screws, brass, in the form of an equilateral triangle.

The T-square is now completed. (See fig. 107.)

Exercise XXV.

TO MAKE A TRY-SQUARE.

This is an exercise in which we are required to make an open mortice. The wood we require will be beech or any other hard wood.

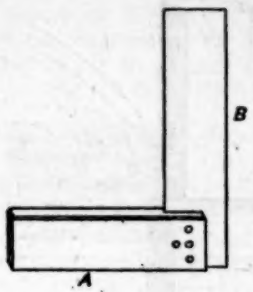


Fig. 19.

As in the previous exercise, the object consists of two parts, a beam or stock and a blade. See fig. 19.

The beam when finished must be 5 in. by 2 in. by $\frac{5}{8}$ in.

The blade when finished must be 9 in. by 2 in. by $\frac{1}{4}$ in.

We plane up the beam to required size, and gauge

Fig. 112.

the line AB, as shown in fig. 112, at a distance of $1\frac{3}{4}$ in. from the end. The mortise will need cutting next and this we do in the following way. In the mortise cut we have to insert the blade, which is $\frac{1}{4}$ in. thick, taking $\frac{1}{4}$ in. from $\frac{5}{8}$ in. we have $\frac{3}{8}$ in. left, $\frac{1}{2}$ of this is $\frac{3}{16}$ in., so that we must gauge lines over the end and down the sides to the line already gauged at a distance of $\frac{3}{16}$ in. from the broadest face. Fig. 112 makes this clear. We have now to remove the matter between the gauge lines and this we do exactly in the same way as in Exercise XXIII. See fig. 106. Now shoot the ends so that we get it 5 in. long. It is now ready for the blade when the mortise has been thoroughly well cleaned out, and not until. Very great care must be taken in doing this, so as to obtain a cutting which is perfectly at right angles. If this is not well done, the blade cannot be fixed properly at right angles in it.

Now the blade claims our attention. This is to be 9 in. by 2 in. by $\frac{1}{4}$ in. Plane up and shoot the ends carefully. Fix in the blade and test it to see if it is a perfect try-square. A very good method to do this is as follows.

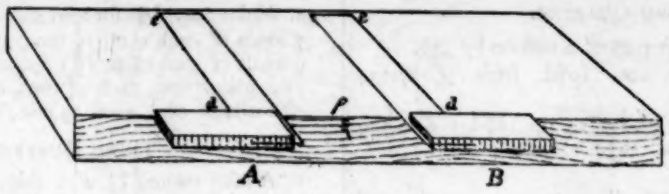


Fig. 113.

Plane up a face side and face edge on a board and lay the new square on the face side and the beam against the face edge. This is shown in fig. 113a. Now draw, with some sharp instrument, a line along DE. See fig. 113. Now turn square over as shown in fig. 113b on the same line. If the square is true, its inner edge will cover the original line DE, if not true the discrepancy will be shown in a striking manner and the error must be rectified accordingly. When it is right, apply a little glue to the mortise and very little to that part of blade which lies inside the beam, and when properly fixed (this must be known by testing) an ordinary hand clamp should be obtained and pressure applied to the beam where the blade rests and it should be put on one side until dry. When this is done, a little sand-paper judiciously applied will improve it, especially where a little glue has oozed out.

(To be continued.)

—o—

Quarterly Arithmetical Tests.

BY JOSEPH WOLLMAN,

Head Master of the Wellgate Board School, Rotherham.

STANDARD I.—FIRST QUARTER.

1. 350 / 29 / 406 / 7 / 83

2. 478 / 32

3. 639 / 505

4. There are 286 boys and 359 girls in an infant school. How many are there together?

SECOND QUARTER.

1. 8 / 45 / 761 / 6 / 297

2. 746 / 638

3. 529 / 50

4. From the sum of 6 times 7 and 4 times 9 take the sum of 5 times 7 and 3 times 8.

THIRD QUARTER.

1. 39 / 570 / 818 / 5 / 694

2. 814 / 726

3. 103 / 5

4. A boy had a hundred nuts. He gave 28 to his brother and 36 to his sister. How many had he for himself?

STANDARD II.—FIRST QUARTER.

1. 45,080 + 36 + 2,907 + 87,024 + 9 + 6,512.

2. What is a dozen times 39,645?

3. From one hundred thousand subtract nine thousand eight hundred and seventy-six.

4. How many oranges would be required for a class of 49 scholars, if each child got three and the teacher got seven?

SECOND QUARTER.

1. What is the difference between 28,037 and 31,023?

2. 67,904 × 579.

3. Divide forty-two thousand four hundred and eighty by six, and write the answer in words.

4. A boy lives 160 yards from school. How many yards does he go weekly to and from school, if he goes home to dinner?

THIRD QUARTER.

1. What is the product of 78,456 and 860?

2. Divide 67,109 by 7.

3. Take 79,018 from 80,003.

4. A shopkeeper brought 3 pieces of cloth each 58 yards long. He sold 94 yards, and 13 yards were spoiled. How much had he left?

STANDARD III.—FIRST QUARTER.

1. What is the nineteenth part of 130,701?

2. 496,580 ÷ 738.

3. If the dividend is 631,179 and the quotient is 6,507, what is the divisor?

4. A shopkeeper sold 397 yards of calico on Monday, 286 on Tuesday, 514 on Wednesday, 478 on Thursday, 169 on Friday, and 732 on Saturday. How many more yards were sold on Monday, Wednesday, and Saturday, than on the other three days?

SECOND QUARTER.

1. Add £630 15s. 9½d., £8 13s. 10½d., £726 18s. 5¾d., £89 17s. 11½d., £5 12s. 4¾d., and £904 19s. 8½d.

2. Divide 507,960 by 85, and multiply the quotient by 970.

3. What is the difference between £28 2s. 10½d. and £856 13s. 6¾d.?

4. A horse and a cow cost £33 12s. 6d. The cow cost £13 15s. How much more did the horse cost than the cow?

THIRD QUARTER.

1. Divide the eighth part of a million by 356.

2. Take £47,068 10s. 10¾d. from £207,034 9s. 7½d.

3. £18,795 15s. 11½d. + £14 19s. 8¾d. + £60,529 17s. 6½d. + £756 4s. 10¼d. + £9,384 13s. 7¾d. + £35,068 6s. 9d.

4. Frank had 9s. 9d., Tom twice as much, and Harry twice as much as Tom. How much had they together?

STANDARD IV.—FIRST QUARTER.

1. Divide £205,007 16s. 10½d. by 390.

2. What is 57 times £674 15s. 10¾d.?

3. How much would it cost to pay 750 men for 5 days, if each got 5s. 9d. a day?

4. A farmer sold 46 sheep and 19 cows for £432. The price of each cow was £12 15s.; what was the price of each sheep?

SECOND QUARTER.

1. Reduce $7\frac{3}{4}$ miles to inches.

2. Multiply 9½d. by 18,796. (Work by reduction.)

3. A grocer bought tea at £11 per cwt., and sold it at 2s. 6d. a lb. What did he gain on half-a-ton?

5. A piece of land measuring 6 acres was divided into 250 gardens; allowing 1,040 square yards for paths, how many square yards did each garden contain?

THIRD QUARTER.

1. How often is 2 qrs. 7 bus. 3 pks. 1 gal. contained in five hundred quarters?

2. How many seconds are there in the last six months of the year?

3. A boy walks 3 miles 220 yards in an hour. How long will it take him to walk 75 miles at the same rate?

4. A gang of 228 labourers earn £18,969 12s. in a year. How much does each one earn weekly?

STANDARD V.—FIRST QUARTER.

1. What is the value of 49 yards 2 ft. 11 in. at 14s. 3d. per yard?

2. 2 Find the value of 79 acres at 7s. 9d. per square yard.

3. What is the expense of making 98 mls. 6 fur. 28 pls. of railway at £3,976 10s. per mile?

4. Find by practice the value of 18,736 articles at £7 16s. 8¾d. for four.

SECOND QUARTER.

1. In what time ought 20 men to perform the same work which 10 men and 10 boys can do in 30 days, it being given that 6 men can do as much as 10 boys?

2. What will be the wages for 13 years 10 calendar months at £12 15s. 9d. per year?

3. What is the income of a person who pays 7d. in the pound for income-tax, and has remaining £2,796?

4. Make out a bill for:—
7 loads of coal, each $1\frac{1}{4}$ tons, at 10s. 6d. per ton;
9 loads of coal each, $1\frac{1}{2}$ tons, at 11s. 9d. per ton;
11 loads of coal, each $1\frac{3}{4}$ tons, at 12s. 6d. per ton;
13 loads of coal, each 15 cwt., at 14s. 6d. per ton.

THIRD QUARTER.

1. A man owned $\frac{11}{13}$ of a ship, and sold $\frac{4}{11}$ to one person, and $\frac{3}{10}$ to another. What part of the ship did he still own?

2. If a person has 5 fires burning regularly, each consuming 20 lbs. of coal daily, what will be the coal bill for the year when coals are 11s. 8d. per ton?

3. Find the least number that can be divided exactly by 7, 15, 21, 35, 40, and 45.

4. A grocer bought 2 tons 17 cwt. 3 qrs. of sugar at £18 per ton. He sold half of it at 2 lbs. for 4½d., and the other half at 2½d. per lb. What did he gain?

STANDARD VI.—FIRST QUARTER.

1. Multiply the difference between ·76 and ·694 by the sum of 4·859, 9·763, and 15·4278.

2. Find the value of $6\frac{3}{8}$ of $1\frac{5}{9} + 7\frac{2}{5}$ of $2\frac{1}{4} - 3\frac{5}{6}$ of $4\frac{7}{15}$.

3. Divide the product of $8\cdot4\frac{5}{7}$ and $3\cdot9\dot{2}\dot{7}$ by $5\cdot\dot{3}8\dot{6}$.

4. Simplify:— $\dfrac{3\frac{3}{4} + 6\frac{5}{12} - 4\frac{7}{8}}{5\frac{2}{9} - 2\frac{5}{6} + 8\frac{5}{10}}$.

SECOND QUARTER.

1. A garrison of 2,000 men, victualled for 120 days, was reinforced at the end of 36 days, and then the provisions were exhausted in 60 days. What was the number of men in the reinforcement?

2. Reduce $\frac{7}{11}$ of $2\frac{1}{4}$ tons to the fraction of 5 tons 15 cwt. 19 lbs.

3. If 2·75 lbs. of sugar cost ·58$\frac{1}{3}$s., what is the value of 6·875 cwt.?

4. A cistern has two pipes. One can fill it in 10 minutes, and the other in 12 minutes. In what time will it be half full if both are opened together?

THIRD QUARTER.

1. Find the interest on £276·25 for 4·75 years at 2·$\dot{6}$ per cent.

2. If one-fifth of my money is 3s. 9d., what is the value of $\frac{3}{5}$ of the remainder?

3. What principal will amount to £302 9s. in 7 years at $4\frac{1}{2}$ per cent.?

4. A grocer mixes 2 lbs. of tea at 3s. per lb. with 3 lbs. at 2s. 4d. per lb. What is the value of 300 lbs. of the mixture?

STANDARD VII.—FIRST QUARTER.

1. The sum of £875 was lent for 4 years and £980 was returned. What was the rate per cent.?

2. A bankrupt surrenders his property, worth £672, to three creditors, to whom he owes respectively £900, £1,120, and £1,340. Divide the property fairly among them.

3. What is the amount of £796 13s. 4d. in $4\frac{3}{5}$ years at $2\frac{5}{8}$ per cent.?

4. What will it cost to paint a wall 17 ft. 8 in. long and 16 ft. 6 in. high at 8d. per square foot?

SECOND QUARTER.

1. A dealer bought 40 sheep at an average price of £2 15s. each; 7 cost £2 9s. 6d. each, and 15 cost £2 7s. 9d. each. What did each of the remainder cost?

2. In what time will £316 5s. gain £59 0s. 8d. at 3½ per cent.?

3. I bought 7¾ acres of land at £78 10s. per acre, 5¼ acres at £69 15s. per acre, and 6½ acres at £57 8s. per acre. What was the average price per acre?

4. A can do a piece of work in 4 days, B in 6 days, and C in 8 days. If they work together and 6s. 6d. is paid for the work, what should each receive?

THIRD QUARTER.

1. A house is insured so that in case of loss by fire both the value of the house and the premium paid will be recovered. If the premium paid at 2¼ per cent. is £108, what is the value of the house?

2. A broker bought 197 railway shares at 1⅝ per cent. discount and sold them at 1⅛ per cent premium. What did he gain?

3. A grocer bought tea at £15 per cwt., and gained 12 per cent. What did he charge per lb.?

4. Find the rate of interest on money invested in the 4½ per cents. at 106½, brokerage being ⅛ per cent.

ANSWERS.

STANDARD I.

FIRST.	SECOND.	THIRD.
1. 875.	1,117.	2,126.
2. 446.	108.	88.
3. 134.	479.	98.
4. 645 children.	19.	36 nuts.

STANDARD II.

FIRST.	SECOND.	THIRD.
1. 141,568.	2,986.	67,472,160.
2. 475,740.	39,316,416.	9,587.
3. 90,124.	7,080.	985.
4. 154 oranges.	3,200 yards.	67 yards.

STANDARD III.

FIRST.	SECOND.	THIRD.
1. 6,879.	£2,366 18s. 2½d.	351+44.
2. 672+644.	5,796,720.	£159,965 18s. 8¾d.
3. 97.	£828 10s. 8½d.	£124,549 18s. 5¾d.
4. 710 yards.	£6 2s. 6d.	£3 8s. 3d.

STANDARD IV.

FIRST.	SECOND.
1. £525 13s. 2½d. + 270 q.	491,040 inches.
2. £38,463 6s. 0¾d.	£724 8s. 7d.
3. £1,078 2s. 6d.	£30.
4. £4 2s. 6d.	112 square yards.

THIRD.	
1. 167 times + 103 gals.	3. 24 hours.
2. 15,897,600 seconds.	4. £1 12s.

STANDARD V.—FIRST.

1. £35 12s. 1¼d.
2. £148,164 10s.
3. £393,027 6s. 4½d.
4. £36,705 19s. 5d.

SECOND.

1. 24 days.
2. £176 17s. 10½d.
3. £2,880.
4. £4 11s. 10½d. + £7 18s. 7½d. + £12 0s. 7½d. + £7 1s. 4½d. = £31 12s. 6d.

THIRD.

1. 1⅛⅛.
2. £9 10s. 1¼d.
3. 2,520.
4. £12 0s. 7½d.

STANDARD VI.

FIRST.	SECOND.	THIRD.
1. 1·9832868.	800 men.	£34 19s. 10d.
2. 9⅛.	2880/1285.	10s.
3. 6144/1771.	£8 3s. 4d.	£230.
4. 1⅛⅛.	2⅛ minutes.	£39.

STANDARD VII.

FIRST.	SECOND.	THIRD.
1. 3 per cent.	£3 3s. 2½d.	£4,692.
2. £180, £224, £268.	5¼ years.	£541 15s.
3. £894 5s. 2d.	£69 2s. 2 1/13d.	3s.
4. £9 14s. 4d.	A 3s., B 2s., C 1s.6d.	£4 4s. 4 4/13d. %

—o—

My School Examination under the New Code.

BY THE HEAD MASTER OF A PROVINCIAL BOARD SCHOOL.

STANDARD I.

Reading.—A third of the class read.

Writing.—A third of the class wrote a line out of the reading book.

Arithmetic.—A third of the class had the following sums dictated:—

1. Add 6, 140, 314, 56 and 39. 555. Ans.
2. From 403 take 48. 355. Ans.
3. There are 110 children in a class, and 53 are girls. How many boys are there? 57 boys. Ans.

Mental Arithmetic.—

1. 19 nuts + 11 nuts. 30. Ans.
2. Divide them amongst 4 boys. 7 each. Ans.
3. How many would be left? 2. Ans.
4. 39 + 31. 70. Ans.
5. How many tens are there in 70? 7. Ans.
6. How many tens are there in 120? 12. Ans.
7. What is the cost of 4 lbs. at 2½d. per lb.? 10d. Ans.
8. What change would you get out of a shilling? 2d. Ans.
9. How many apples at two a penny could you get for 1s.? 24. Ans.
10. How many could you get for the same money at two for a halfpenny? 48. Ans.
11. I had 21 marbles, and I gave half of them away. How many had I left? 10½. Ans.
12. How many apples must I cut up to give 9 boys half each? 5. Ans.
13. How much is left? ½ an apple. Ans.

Geography.—

1. If I go outside how can I find the north?

2. How can I find it at night?

3. How does a sailor find the north?

4. When can I find the north by looking at the sun?

5. Point to north, south, east, and west.

6. The Inspector threw up a piece of chalk, and asked, what direction did it go?

7. If I saw the sun rise, where is the north?

8. If I made a mark on the ceiling who could show it me on the plan?

9. Why not?

10. The Inspector then we t to different parts of the room, and asked the children to show him on the plan where he stood.

11. The Inspector pointed to the map of England and asked, how many miles is it from top to bottom?

12. How can I find how far it is from one place to another?

13. How are towns, rivers, and mountains marked on a map?

The teacher then questioned the class on the compass.

Grammar.—

1. The Inspector held up a penny and asked, what is this?

2. Is it a noun?

3. What is the noun belonging to it?

4. What is a Noun?

5. How can I tell a noun?

6. Who can tell me a noun?

7. Tell me the noun in this: 'I tell the truth.'

8. And in this: 'He can hop, skip and jump.'

9. The Inspector called on a boy to give him a noun out of his pocket.

10. Why can't he give me a noun?

Recitation.—Three boys said a verse each, and the remainder was said by the class.

Searching questions were then asked.

STANDARD II.

Reading.—The Inspector asked for the merit list of the class, and marked every third name. These were told to come out with two books each.

Writing.—While the reading was going on the dictation was taken, and it was given by the teacher of the class. The boys following each of the readers on the merit list took the dictation, and a few others who were not taking reading.

The following was the piece of dictation:—

Back trots the kind dog carrying the sweet bone. He lays it down at Flash's side. He then lies down himself, and watches Flash as he devours it, wagging his tail all the time. He is glad to have his guest enjoy himself.

Arithmetic.—The Inspector then told the remainder to do the Arithmetic, also a few boys who had read or had done the dictation.

The following sums were dictated:—

1. From 13,001 take 9,065. 3,936. Ans.

2. Divide 16,530 by 9. 1,836 + 6. Ans.

3. Multiply 7,089 by 690. 4,891,410. Ans.

4. I have 8 bags of apples, and 253 in each bag. There are 310 bad ones. How many good ones have I? 1,714 apples. Ans.

Mental Arithmetic.—1. What is the cost of 4 lbs. of sugar at 2½d. per lb.? 10d. Ans.

2. What would 5 lbs. cost? 1s. 0½d. Ans.

3. How much change would you get out of a florin? 11½d. Ans.

4. How many halfpence could you get for that? 23. Ans.

5. How many oranges at a halfpenny each could you get for 11½d.? 23. Ans.

6. How many could you get at 2 for a halfpenny? 46. Ans.

The Inspector then asked the teacher to give a few questions. He afterwards wrote a number on the board, and asked the children to divide it by 10 and by 100.

Geography.—1. The Inspector began by saying—Suppose my head was a piece of land, my neck and body land, what name would you give to my neck?

2. Suppose they were changed into water, what would my neck represent?

3. What does the word 'strait' mean?

4. Who can spell 'strait'?

5. What is an isthmus?

6. Tell me one in England.

7. What is a channel?

8. Name one in the south of England.

9. What is the difference between a channel and a strait?

10. What is an estuary?

11. Give me a river that has an estuary.

12. What is the use of an estuary?

13. What flows up an estuary?

14. What is a promontory?

15. What is an opening?

16. What is the difference between a bay and a gulf?

17. The Inspector drew a river on the board, and wished to know why he had drawn it thicker at the mouth than at the source.

18. What is a tributary?

19. He asked a boy to stand on the form, and said, Suppose the boy was a piece of land, what would he represent?

20. What part of the mountain would his head represent?

21. What part would his feet represent?

22. He then told a row of boys to stand up, and asked what they represented.

23. What range in England do you know?

24. Then he asked the boy to stand up again, and said, What kind of a mountain would he be if smoke, &c., came out of his head?

25. What is the bed of a river?

26. Who made the bed of the river?

The teacher was then told to ask a few questions on the shape and size of the earth.

Grammar.—

1. In the sentence 'I had a good wash this morning,' where is the verb?'

2. What part of speech is 'wash'?

3. Give me a sentence with 'wash' as a verb.

4. In like manner he treated the words *watch, light, walk, skip, hop, jump.*

Sometimes the Inspector gave a sentence, and asked what part of speech such a word was, and sometimes he asked them to make a sentence with such a word as a noun, and then as a verb.

Recitation.—The Inspector began by asking the meanings of the piece. Then he called upon four or five boys to say a verse each, then the class to say a verse, and a boy to say the last verse.

STANDARD III.

Reading.—The Inspector selected nearly half the class for reading. This did not include the boys who had done neither Writing or Arithmetic. Some boys did two subjects, whilst others did none. In the reading, questioning was the chief point.

Writing.—About a third of the class did dictation. The following was the piece chosen out of the Historical Reader:—

When King Edward heard of this, he resolved to conquer the whole of Scotland, and led a large army to the north. But, ere he reached the borders, death stayed his progress, and left Bruce to pursue his way to victory; but at last, even the worthless English king was forced to prepare for war.

Arithmetic.—About a third of the class were selected for Arithmetic.

The following were the questions:—

Card I.—1. Take £681 15s. 1½d. from £19,809 18s. 4¾d. £19,128 3s. 3¼d. Ans.

2. Divide 98,010 by 891. 110. Ans.

3. £38,006 17s. 2¼d. + £97 11s. 10½d. + £806 14s. 7d. + £1,962 4s. 4¾d. + £9,040 18s. 6½d. £49,914 6s. 7d. Ans.

4. A train starts from London at six o'clock in the morning, and gets at its journey's end at three o'clock in the afternoon. The train goes at the rate of 45 miles an hour. How many miles has it travelled? 405 miles. Ans.

Card II.—1. Divide 612,000 by 387. 1,581 + 153. Ans.

2. £874 15s. 6¾d. + £9,060 4s. 8½d. + £39,284 18s. 11d. + £397 13s. 2¼d. + £2,150 7s. 3½d. £51,767 19s. 8d. Ans.

3. Take £894 16s. 4¾d. from £9,002 7s. 10d. £8,107 11s. 5¼d. Ans.

4. In a wood there were 3,040 oak, elm, and ash trees. There were 97 ash and 962 elm trees. How many oak trees were there? 1,981 oak trees. Ans.

Mental Arithmetic.—

1. How many ounces are there in 1 lb.? 16. Ans.

2. How many ounces are there in ¼ lb.? 4. Ans

3. If tea is 2s. 8d. a lb., how much would ¼ lb. cost? 8d. Ans.

4. How much would ¾ lb. cost? 2s. Ans.

5. How much would 1¾ lbs. cost? 4s. 8d. Ans.

6. How much would an ounce cost? 2d. Ans.

7. How did you do it?

8. What would it be for 10 hours at 7½d. an hour? 6s. 3d. Ans.

9. Add 6, 7, 4. 17. Ans.

10. Add 7, 6, 4, 5. 22. Ans.

11. Add 9, 6, 5, 8, 2, 4. 34. Ans.

Geography.—The Inspector asked the teacher to question on England south of the Thames.

He afterwards questioned them on Wales.

1. Name a large bay round the English coast.

2. What counties touch it?

3. What peninsula overhangs it?

4. What mountains are in Carnarvon?

5. Name another peninsula.

6. What bay is in Pembroke?

7. What is the name of the place on St. Bride's Bay?

8. Tell me a harbour in Pembroke.

9. What is the name of the large coal-field in Wales?

10. What places are on it?

11. What else do they get from the coal-field?

12. In what counties is the South Wales coal-field?

13. Any other county besides Glamorgan?

14. At what place in Glamorgan do they smelt copper?

15. Where do they get it from?

16. What do the Cambrian and Cumbrian groups take their names from?

17. What county is Windermere in?

Grammar.—When I go forth upon my way.

1. What part of speech is *forth*?

2. What part of speech is *my*?

3. What part of speech is *sleep*?

4. Can it be any other part of speech?

5. What is an Adverb?

6. Give me a sentence with an Adverb modifying a Verb.

7. Give me a sentence where it modifies an Adjective.

8. Give me one where it modifies another Adverb.

Recitation.—Very searching questions were asked about the recitation, and then children were called upon to say it.

STANDARD IV.

Reading.—The Inspector read out the names of about a third of the class from the Merit List. These read from the Historical Readers. About five minutes was afterwards allowed them to read a passage from the same books silently, and then the Inspector questioned them on the meaning of what they had read to test their intelligence.

Writing.—The names of those to write the dictation were also read from the Merit List.

The following was the *unseen* passage:—

Upon this the dial plate—if we may credit the fable—changed countenance with alarm; the hands made a vain effort to continue their course; the wheels remained motionless with surprise; the weights hung speechless; and each member felt disposed to lay the blame upon others. At length the dial asked for an inquiry to be made as to why it had stopped, when hands, wheels, and weights with one voice said they were innocent.

Arithmetic.—The Inspector directed about half the class to do the sums. These were worked while the Reading and Dictation were taken. Every boy in the class did some work for the Inspector. Some read and then wrote dictation. Others read and also did sums. Those who wished to get Certificates of Proficiency were examined in all subjects.

The following were the questions:—

Card I.—

1. If £211 4s. 7½d. is to be divided among 209 men, what is each man's share?
£1 0s. 2½d. + 52q. Ans.

2. Reduce 13 sq. po. 5 sq. yds. to sq. feet.
3,584½ sq. ft. Ans.

3. £6,847 7s. 9½d. × 107.
£732,670 13s. 8½d. Ans.

4. If potatoes are 4d. a gallon, how much shall I gain if I buy 24 sacks at 6s. 3d. a sack (3 bushels = 1 sack)?
£2 2s. Ans.

Card II.—1. Divide £9,604 17s. 6¾d. by 97.
£99 0s. 4½d. + 57q. Ans.

2. Bring 360,000 pints to bushels.
5,625 bushels. Ans.

3. Reduce 6 sq. po. 9 sq. ft. to sq. ft.
1,642½ sq. ft. Ans.

4. A flock of sheep containing 156 is worth £343 17s. Forty-two of the sheep die. What is the value of the remainder?
£251 5s. 6d. Ans.

Card III.—1. Reduce 12 tons 17 cwt. 1 stone 27 lbs. to ounces.
461,200 oz. Ans.

2. £2,896 17s. 6d. ÷ 32.
£90 10s. 6½d. + 8q. Ans.

3. Reduce 5,280,630 inches to miles.
83 miles 2 fur. 29 po. 4½ yds. 6 in. Ans.

4. If a gallon of water weighs 10 lbs., what would a barrel containing 17 cwt. 3 qrs. 20 lbs. weigh?
201 gallons. Ans.

Mental Arithmetic.—

1.	72 articles at 2s. 6d.	£9. Ans.
2.	72 „ „ 7½d.	£2 5s. Ans.
3.	72 „ „ 7s. 6d.	£27. Ans.
4.	72 „ „ 12s. 6d.	£45. Ans.
5.	288 „ „ 7½d.	£9. Ans.
6.	288 „ „ 3¾d.	£4 10s. Ans.

The Inspector wrote each of the given questions on the board, and required the scholars to work them for him. He was very particular about getting to know the way by which they had arrived at the result, and also in getting them to tell him how one result might be got from a previous one.

Geography.—The teacher questioned the class on Ireland.

The Inspector then questioned them on Scotland and British North America.

1. In what county is Wick?
2. For what is Wick noted?
3. Name another town in Sutherland.
4. If I come down from Wick along the coast, what rivers shall I pass?
5. What canal has been made across Scotland?
6. Why was it easy to make this canal?
7. Name a town at the east end of the canal?
8. What is exported from Inverness?
9. Why was a canal not made from Glasgow to Aberdeen?
10. What large town shall I come to after leaving Inverness?
11. What does the word Aberdeen mean?
12. What is exported from Aberdeen?
13. What kind of land is there about Aberdeen?
14. If I sail down the Dee, what residence shall I find on its banks?
15. Name a large town on the Tay.
16. Name all the exports of Dundee.
17. What old town is near Dundee?
18. Where is Perth?
19. For what is it noted?
20. Tell me the capital of Scotland.
21. Is it the largest town?
22. What is?
23. Why is Glasgow larger than Edinburgh?
24. What places does Glasgow trade with?
25. What kind of vessels leave Dundee?
26. Where do they go to fish?
27. Which parts of the whale do we use?
28. Name a whaling station near Aberdeen.
29. Name a very dirty town near Stirling.
30. Why was the Caledonian canal made?
31. How long will it take to go to America?

32. Name some of the Atlantic liners.

33. In entering the mouth of the St. Lawrence, name some islands that would be passed.

34. What is the capital of Newfoundland?

35. How are the people of Newfoundland employed?

36. Name some fish caught.

37. What does the St. Lawrence pass through?

38. Name these lakes.

39. Could we sail down the river St. Lawrence between Erie and Ontario?

40. Why?

41. What has been cut?

42. Name the towns in order which I should pass in sailing up the St. Lawrence.

43. Say for what each is noted.

44. Is Montreal a large or small town?

45. Why?

46. What bridge ought I to see before I leave Montreal?

47. Why is it easy to cross British North America?

48. Why is it called the Canadian Pacific Railway?

49. Name the capital of Canada.

50. For what is Quebec noted?

51. What railway runs through Winnipeg?

52. What is Winnipeg the capital of?

53. Name the province in the Far West.

54. What is the capital?

55. Name the former capital.

56. Name all the things we get from British Columbia.

57. Name the rivers.

58. Of what use is British North America to us?

59. From which district are the furs got?

60. By whom are they got?

61. From whom do we get them?

Grammar.—

1. But even now in his dying fear
One dreadful sound could the rover hear.

2. One lovely hand she stretched for aid.

These sentences were written on the board, and the Inspector questioned the class thoroughly, wishing to know the reason for every statement made. Sentences were also made containing transitive and intransitive verbs, and the children were required to state to which class they belonged and why.

Examples were also asked for of cases where adverbs modified adjectives.

Recitation.—The Inspector asked the teacher to call on a few of his best reciters. The Inspector afterwards questioned on one half of the piece, and the teacher on the other half.

STANDARD V.

Reading.—About half of the class read from the Historical Reader.

Writing.—About half did writing, and these were divided for composition and dictation.

Composition.—

'Before Queen Victoria was crowned she had a very narrow escape. She was cruising in a yacht in the English Channel when a storm came on. The Princess came on deck to watch it. Presently the mainmast was heard to crack. On hearing this the pilot, who was standing by, leaped to the princess, caught her in his arms, and carried her to a place of safety. Just then the mast came down with a terrific crash just on the place where the princess had been standing. Had it not been for the pilot's brave action we should have had no good Queen Victoria. He was promoted, and at his death the Queen with her usual kindness provided for his family.'

Dictation.—From the ordinary reader:—

'He was a great favourite with the veteran, whose vivacity he had continually to keep in check. They were in search of deer when suddenly a huge grizzly emerged from a thicket about thirty yards distant, rearing himself on his hind legs with a terrific growl, and displaying a hideous array of teeth and claws.

Arithmetic.—About a third were examined in arithmetic.

The following were the questions:—

Card I.—1. How many days will 30½ tons last, if used at the rate of 1 ton, 10 cwt., 2 qrs., per day?
20 days. Ans.

2. Find the cost of 740 articles at 16s. 11d. each.
£625 18s. 4d. Ans.

3. How much must be added to $\frac{5}{6}$ to make $\frac{1}{7}$?
$\frac{1}{42}$. Ans.

4. A merchant bought £1,260 worth of cheese at 84s. per cwt. He sold it at 10d. per lb. Find the total gain.
£140. Ans.

Card II.—1. Make a bill for—

9	lbs. of coffee	at	1s. 7½d.	per lb.
15	„ tea	„	2s. 4d.	„ „
14	„ starch	„	3¼d.	„ „
1¼	„ pepper	„	1s. 7d.	„ „
3½	„ cloves	„	2½d.	„ oz.

14s. 7½d. + £1 15s. + 3s. 9½d. + 1s. 11¾d. + 13s. 4d. = £3 8s. 8¾d. Ans.

2. How much is $\frac{1}{5}$ more than $\frac{1}{2} + \frac{1}{10}$?
$\frac{1}{5}$. Ans.

3. How many yards can be purchased for £1 13s., when 81 yards cost £10 2s. 6d.?
13½ yards. Ans.

4. What is the value of 1,275 articles at 14s. 7d. each?
£929 13s. 9d. Ans.

STANDARDS VI. AND VII.

Reading.—All in these Standards read from the ordinary reading-books.

Writing.—Half Standard VI. and all Standard VII. did Composition.

The following were the subjects:—

Industry; Cocoa; How to Spend the Evenings; Best Picture in our House; an Ostrich Egg; Birds' Eggs; Manufacture of a Spoon; War; Our Law Makers; How People used to Keep the Time; What Trade I should like to be.

Arithmetic.—Half Standard VI. did Arithmetic.

Card I.—1. Divide 19,082 by ·0658, and multiply the quotient by 1·105. 320·45. Ans.

2. Find the value of $\frac{(2 + \frac{1}{3}) \div 3\frac{1}{7}}{(\frac{1}{2} - \frac{1}{3}) \text{ of } 1\frac{3}{4}}$.

$2\frac{2}{5}$. Ans.

3. At what rate per cent. will the interest on £725 amount to £114 3s. 9d. in $3\frac{1}{2}$ years?

$4\frac{1}{2}$ per cent. Ans.

4. A grocer buys sugar at £56 per ton, and sells every 10 lbs. for 5s. 3d. How much does he gain on each £1 of his outlay? 1s. Ans.

Card II.—1. Divide the sum of $2\frac{1}{8} + 1\frac{3}{5} + \frac{9}{10} + \frac{1}{3}$ by the difference of $6\frac{9}{15}$ and $7\frac{1}{8}$. $7\frac{7}{8}$. Ans.

2. Find the value of ·12$\dot{7}$ of £2 15s. + ·5$\dot{4}$ of 8s. 3d. 11s. 6d. Ans.

3. Required the simple interest on £551 for $3\frac{1}{2}$ years at $2\frac{1}{2}$ per cent. £48 4s. 3d. Ans.

4. A dealer buys a number of articles at 4s. 2d. each. He charges ·07 of the price for carriage and ·25 for profit. What does he ask for each article?

5s. 6d. Ans.

The following were some of the Standard VII. questions:—

1. How much should I lose or gain in income by transferring £900 from the 3 per cent. stock at 90 to $4\frac{1}{2}$ per cent. stock at 108? £6 15s. Ans.

2. Divide £5 13s. 4d. by $7\frac{3}{11}$. 15s. 7d. Ans.

3. A man paid £210 18s. 9d. to his creditors at 5s. 7½d. in the £. How much did they lose?

£539 1s. 3d. Ans.

4. When the $3\frac{1}{2}$ per cents. are at par, to get an income of £56 what amount of stock should I have to buy? £1,600. Ans.

5. I bought $7\frac{1}{4}$ shares at £248 per share. In the first year I gain £67 8s. 6d. What was the gain per cent, on what all the shares cost me?

$3\frac{3}{4}$ per cent. Ans.

6. A man and his three sons earn £2 4s. What do they each earn, if the ratio is 7, 4, 3, 2?

19s. 3d., 11s., 8s. 3d., 5s. 6d. Ans.

Mental Arithmetic.—Standards V.—VII. These standards were questioned by the teacher, and the Inspector added the following:—

If I buy an article for 5s. and sell it for 5s. 6d., what do I gain per cent? 10 per cent. Ans.

What fraction of the cost price is the profit?

$\frac{1}{10}$ Ans.

What fraction of the selling price is the profit?

$\frac{1}{11}$ Ans.

Add 1000 + 15 + 10 + 20 + 125 + 40.

1,210. Ans.

Geography.—Standards V. and VI.—Europe. The maps of France, Italy, and Spain and Portugal were given alternately. They were first taken by the teacher, and then the Inspector asked the following questions:—

1. What is the largest country in Europe?
2. Tell me the capital.
3. What is the most important river of Russia?
4. Where does it rise?
5. What kind of country does it flow through?
6. Where does it empty itself?
7. Where would you go from the Caspian Sea in a vessel?
8. What kind of a mouth has the Volga?
9. What town stands on the Delta?
10. Suppose you stayed at Astrakan all the year round, what fish would you most likely see?
11. What country is this? (Pointing to France.)
12. What river is this? (Loire.)
13. Follow its course, and tell me what town this is. (Nantes.)
14. Where does the Loire empty itself?
15. Suppose you stood at the mouth ol the Tagus and at the mouth of the Rhone, where would you see the most tide?
16. What town is this? (Barcelona.)
17. What is it noted for?
18. Now follow this river, what is it? (Rhone.)
19. What country does it rise in?
20. What lake does it flow through?
21. Name a town on the lake?
22. What town stands at the confluence of the Rhone and its main tributary?
23. What is it noted for?
24. Suppose I go from France to Spain, what mountains do I cross?
25. Now what country would have disappeared, if not looked after?
26. Where would it have gone to?
27. What prevented this?
28. What are dykes?
29. What do we get from Holland?
30. Where is Vienna?
31. Tell me an inland sea in Russia.
32. Now tell me a sea that has an outlet.
33. Give me a port on it.
34. It is now 5 minutes past 11, what time is it at St. Petersburg?
35. Why?
36. Now suppose you go 30° west, what will be the time?
37. Suppose I went to Holland, would my watch be right?
38. Now look at the map, and tell me what time it will be at the river Ebro a few miles from the mouth. (Same time.)
39. Why?
40. It is now 14 minutes past eleven, what time is it at the capital of Ireland?
41. How many degrees are there from the Equator to the North Pole?
42. How many degrees can we go east of Greenwich?
43. How many degrees can we go west?

Geography.—Standard VII.—The following maps were given :—

The United States, Eclipses, Solar System, Tides.

1. Draw a diagram showing the relative positions of the Sun, Moon and Earth during spring tides.

2. Name the planets in the order of their distance from the sun, and describe one of them.

3. Which is the largest ocean ?

4. Which has the most commerce ?

5. What kind of tides are there when it is full and new moon ?

6. What is the difference between planets and stars ?

7. What is meant by enlarging the disc ?

Grammar.—Standard V.—The teacher first questioned the class and then the Inspector.

Sentence.—Through an Alpine village passed a youth.

The sentence was analysed, and some words parsed.

1. Form an adverb from 'beautiful.'

2. How ?

3 What is 'wisdom' ?

4. What kind of a noun ?

5. Form an adjective from it.

6. How do you form an adverb from 'wise' ?

STANDARDS VI. AND VII.

1. What is a complex sentence ?

2. Can we have two sentences coupled together, and not forming a complex sentence ?

3. Why ?

4. Is 'The way was long, the wind was cold,' a complex sentence ?

5. How many kinds of subordinate sentences are there ?

6. What places may the noun sentence occupy ?

7. In the complex sentence 'The book which I bought is very interesting,' which is the subordinate sentence ?

8. What kind is it ?

9. Analyse 'which I bought' on your slates.

10. What case is 'which' ?

11. What is the prefix in the word 'preposition' ?

12. What does preposition mean then ?

13. What is the prefix in 'conjunction' ?

14. What does conjunction mean ?

15. What prefix means after ?

16. What is the prefix in 'adjective' ?

17. What does adjective mean ?

18. What is the prefix in 'adverb' ?

19. What are adverbs used in conjunction with ?

Recitation.—Standards V.—VII.—Very searching questions were asked on the recitation. Scholars were then called upon, both by the Inspector and the teacher, to recite. The Inspector then asked Standard V. to say part of it simultaneously, and afterwards Standards VI. and VII. together.

Music.

DIVISION II.—STANDARDS I. AND II.

1. *Note Test.*—From Modulator by Inspector.

2. *Song Test.*—Two songs were sung.

DIVISION III.—STANDARDS III. AND IV.

1. *Note Test.*—From Modulator by Inspector.

d m r d m s d' t l d' s fe s f fe s m
d s m d' d r f fe s d' t l se s d' m d.

2. *Ear Test.*—**s f m ; f r d ; fe f r ; m r d ; d' l f.**

3. *Time Test.*—To be sung to *laa.*

| d : : | d :— :— | d :d .d: d | d : :d | d :— :— ||

4. *Song Test.*—One verse of a song was sung.

DIVISION IV.—STANDARDS V.—VII.

1. *Note Test.*—Written on board.

(*a*) **d m s ˢd' t d' l m d' ᵈˢ f r m f s l d' t d'.**

(*b*) **l d' t d' m r d m l t d' l se l d' t l t d' l.**

The second test was sung backwards after being sung forwards.

2. *Ear Test.*—**t d' t r' ; t r' d' s ; l se l m.**

3. *Time Test.*—

| l : :l .l | l :- .l :l | l :l .l :- .l }
| l :l :— | l : :l | l :— :— ||

4. *Song Test.*—Two songs were sung.

Our Certificate Class.

BY DR. GEORGE BEACH, M.A.

Co-author of 'Our Mother Tongue,' &c.,

Head Master of Christ Church Schools, Macclesfield.

GENERAL REMARKS.

1. This month we finish the series of Test Questions which are compiled from actual departmental tests.

2. The Examination for Certificates will commence on Monday, the 15th of December, 1890, at Three p.m.

3. Our candidates should bear in mind this most important alteration of the New Code, viz, '*That candidates placed hereafter in the Third Division will not be allowed to take charge of Pupil Teachers.*'

4. Every teacher who has not already obtained permission to sit at the examination is now too late to receive it.

5. We would again remind Acting Teachers that they should procure the requisite MUSICAL CERTIFICATE previously spoken of.

6. Male students should study the higher parts of Algebra, female students Domestic Economy, and both sexes, Music and a little Prosody.

These are the portions of the Syllabus that our limited space has forced us to pay least attention to.

7. Pay particular heed to the geography of Hindostan, as a thorough knowledge of this gains on the average 40 per cent. of the geographical marks as regards females, and 25 per cent. as regards males.

Newfoundland and our African Possessions being now politically prominent, should be well 'got-up.'

Instead of Mr. Stanley's large, expensive, and inaccessible book, 'Stanley in Africa,' published by Walter Scott, should be read.

8. *Correction.*—No. 6 Answer of the Algebra Test should be 400,400 not 200,200 as given. The answer to question 5 also should be $10y^9$ not $10y^3$.

Male Candidates.

SECOND YEAR.

Grammar and Composition.

(*Three hours allowed for this paper.*)

No candidate may omit the exercise in Composition. Questions 1—5 and *either* Question 6 *or* Question 7 may be answered, but *not both* 6 and 7.

Write in plain prose an essay on one of the following subjects:—

(*a*) The character of King Arthur *or* Bolingbroke.
(*b*) 'Each substance of a grief hath twenty shadows,
Which show like grief itself, but are not so.'
(*c*) 'He is all fault who hath no fault at all.'

1. Paraphrase two of the following passages:—

(*a*) 'Now, He that made me knows I see thee ill;
Ill in myself to see, and in thee seeing ill.
Thy death-bed is no lesser than the land
Wherein thou liest in reputation sick:
And thou, too careless patient as thou art,
Committ'st thy anointed body to the cure
Of those physicians that first wounded thee.'
(*b*) 'These are slanders: never yet
Was noble man but made ignoble talk.
He makes no friend who never made a foe.
But now it is my glory to have loved
One peerless, without stain: so let me pass,
My father, howsoe'er I seem to you,
Not all unhappy, having loved God's best
And greatest, tho' my love had no return.'
(*c*) 'Northumberland! thou ladder wherewithal
The mounting Bolingbroke ascends my throne,
The time shall not be many hours of age
More than it is, ere foul sin, gathering head,
Shall break into corruption: thou shalt think,
Though he divide the realm, and give thee half,
It is too little, helping him to all.'

2. Explain the following:—'the boisterous late appeal'—'a dearer merit have I deserved'—'Can sick men play so nicely with their names?'—'Sorrow's eye divides one thing entire to many objects like perspectives'—'a happy gentleman in blood and lineaments, by you unhappied and disfigured clean'—'Twill make me think the world is full of rubs, and that my fortune runs against the bias'—'I put on sullen black incontinent.'

3. Explain the following passages, stating the circumstances under which they occur:—

(*a*) 'Speak it in French, king: say "*pardonnez moi.*"'
(*b*) 'He is come to ope
The purple testament of bleeding war.'
(*c*) 'Welcome, my lords. I wot your love pursues
A banished traitor.'

4. Write notes on the following passages:—

(*a*) 'Arthur let proclaim a joust at Camelot.'
(*b*) 'Our good Arthur broke
The Pagan yet once more on Badon hill.'
(*c*) 'The great Pendragon.'
(*d*) 'His honour rooted in dishonour stood,
And faith unfaithful kept him falsely true.'
(*e*) 'May not your crescent fear of name and fame
Speak, as it waxes, of a love that wanes?'

5. What does Bacon say about iterations?

Explain the following:—

Mi venga la muerte de Spagna—Abeunt studia in mores—Hercules, when he went to unbind Prometheus, sailed the length of the great ocean in an earthern pot or pitcher—Aesop's damsel, turned from a cat to a woman.

6. Comment on the following passage from *Professor Dowden's Shakespere Primer*—'There is no finer contrast in Shakespere's historical plays than that between the figures of the formidable king of deeds and the romantic king of hectic feelings and brilliant words.'

7. Whence did Shakespere obtain the material for the play of Richard II.? Give instances showing in what way he used this material, and what additions he made to it.

Female Candidates.

SECOND YEAR.

Grammar and Composition.

(*Three hours allowed for this paper.*)

No candidate must omit Question 1 or 2, or answer more than six other questions.

1. Write in plain language an essay on *one* of the following topics:—

(*a*) Atmospherical phenomena.
(*b*) The influence of the drama.
(*c*) 'Full many a holy vow and pure resolve
These, as but born of sickness could not live.'

2. Paraphrase *one* of the following passages and explain fully the connection in which it stands:—

(*a*) 'Return again, and take an oath with thee.
Lay on our royal sword your banished hands;
Swear by the duty that you owe to God—
Our part therein we banish with ourselves—
To keep the oath that we administer:
You never shall—so help you truth and God!—
Embrace each other's love in banishment;
Nor never look upon each other's face;
Nor never write, regret, nor reconcile
This low'ring tempest of your home-bred hate;
Nor never by advised purpose meet
To plot, contrive, or complot any ill
'Gainst us, our state, our subjects, or our land.'
(*b*) 'He is our cousin, cousin; but 'tis doubt
When time shall call him home from banishment,
Whether our kinsman come to see his friends.
Ourself, and Bushy, Bagot here, and Green,
Observed his courtship to the common people;
How he did seem to dive into their hearts
With humble and familiar courtesy,
What reverence he did throw away on slaves,
Wooing poor craftsmen with the craft of smiles
And patient underbearing of his fortune,
As 'twere to banish their affects with him.
Off goes his bonnet to an oyster-wench;
A brace of draymen bid God speed him well
And had the tribute of his supple knee,
With "Thanks, my countrymen, my loving friends;"
As were our England in revision his,
And he our subjects' next degree in hope.'

3. Give briefly such explanations as would be necessary to scholars in the Sixth Standard respecting the meaning and force of the following expressions:—

'Any other ground *inhabitable*'—'A *caitiff recreant* to my cousin Hereford'—'A *partial* slander sought I to avoid'—'*Hold out* my horse, and I will first be there'—'The Earl of Worcester *hath broke his staff*'—

'And these *external manners of laments*
Are merely shadows to the unseen grief'—
'Julius Cæsar's ill-erected tower.'

4. Point out any grammatical peculiarities in the following extracts and explain them:—

(*a*) 'Twere no good part
To take on me to keep and kill thy heart.'
(*b*) 'What news from Oxford? Hold these justs and triumphs?'
(*c*) 'His answer was, he would unto the stews.'
(*d*) 'O how it yearned my heart when I beheld!'
(*e*) 'I did wish him dead.'

5. Analyse this sentence:—

'Thou sheer, immaculate, and silver fountain,
From whence this stream through muddy passages
Hath held *his* current and defiled himself!
Thy overflow of good converts to *bad*.'

Comment on the use of the words in italic.

6. Give the substance of Gaunt's last interview with Richard, and describe the character of *either* York *or* Northumberland.

7. What does Trench say of (*a*) '*the hostile use of names*,' (*b*) *Salutations*?

8. Explain and illustrate the following passages :—

(*a*) 'Language is as truly on one side the limit and restraint of thought, as on the other side that which feeds and unfolds thought.'

(*b*) 'Language is fossil poetry.'

9. Comment on the words *tribulation, dactyle, craft, tawdry, integrity, silly, idiot.*

10. Quote (from Richard II. if you can) instances of Apostrophe, Climax, Hyperbole and Diæresis.

Male Candidates.

SECOND YEAR.

History.

(*Two hours and a half allowed for this Paper.*)

Candidates are not permitted to answer more than EIGHT questions.

1. Give the principal provisions of *The Habeas Corpus Act* and *The Second Act of Settlement*. Distinguish between *the Constitutions of Clarendon* and *the Clarendon Code*. *Give dates* and the reasons for the enactment of these laws.

2. Describe as to Standard VII. the reasons for believing that the English monarchy is elective.

3. What were the relations between England and Ireland in the reigns of Henry II., Elizabeth, James II., and in 1798?

4. What wars have been waged between England and Spain from 1587 to 1808? Describe *either* the Battle of the Nile *or* of Trafalgar, *giving the dates* and the immediately preceding circumstances.

5. Under what circumstances did the following places fall into English hands :—Calais, Dunkirk, Jamaica, Gibraltar, Minorca?

6. Explain the grounds *with dates* upon which the following persons were put to death :—Piers Gaveston, Cranmer, Derwentwater, and Byng.

7. Explain the process of making a law from its inception to its complete enactment, *or* describe The Cabinet System.

8. Who wrote '*The Mirrour of Magistrates*,' '*Cymbeline*,' '*Utopia*,' '*Acts and Monuments of the Church*'? What do you know of the *Revival of Learning*.

9. Briefly relate the history of the Reformation from 1485 to 1603.

10. What was the condition of the labouring classes in Elizabeth's reign, and what were the six principal towns?

11. Enumerate the principal plots of the Tudor Period, giving the causes, leaders and results.

12. Explain the terms *transubstantiation, præmunire, benefit of clergy, Lollardism, the Great Bible, Brownists*, and state what you know of the system of monopolies.

Female Candidates.

SECOND YEAR.

(*Three hours allowed for this Paper.*)

Candidates are permitted to answer EIGHT questions only.

1. Mention and describe any instance during the Stuart Period of the assassination of a politician, repudiation of national financial obligations, gross miscarriage of justice, and of horrible massacre.

2. What do you know of *the Colonisation of Ulster, the Battle of Rathmines, the Fund for Reprisals*, and *the Treaty of Limerick*?

3. Describe the principal means of influencing public opinion rom 1603 to 1714.

4. Mention the chief battles of 'The Great Rebellion,' giving the commanders, *dates* and results.

5. What part in political affairs did the Church of England take in Charles I., James II. and William III.'s reign?

6. Who were the chief admirals of the Stuart Period? Write a short life of any one of them.

7. What was the population of England at the time of the Restoration? What were the most important towns, and how was communication maintained between them?

8. Which of the eminent writers of the seventeenth century took an active part in political controversy? Give particulars respecting them and their works.

9. What are the following dates noted for—1605, 1641, 1683, 1697? Who was the last person condemned by Bill of Attainder?

10. Trace the *rise* of the Cabinet System, *or* of the National Debt, *or* of the Standing Army.

11. Who were *the Pilgrim Fathers, the Lords of the Articles*, the chief among *the Regicides, the Cabal, the Abhorrers*, and *the Nonjurors*?

12. Which were the most important laws enacted between 1660 and 1714? How did '*the Constitution*' at the close of the Stuart Period differ from the Constitution at the close of the Tudor Period?

Male and Female Candidates.

SECOND YEAR.

Music.

(*Two hours allowed for this Paper.*)

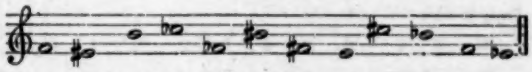
Candidates may answer the questions in either the Staff Notation or the Tonic Sol-fa, but *not both*.

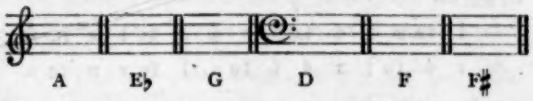
You *are not permitted to answer more than* NINE *questions.*

N.B.—The change from the third to the second person in the above directions is verbatim that used by the Department, and would be highly reprehensible proceeding from an elementary teacher!

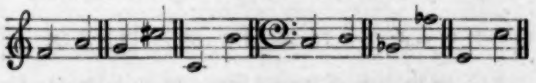
STAFF NOTATION.

1. Write the following notes *one octave lower* in the Bass Clef :—



2. Write the signatures of the following major keys :—

A E♭ G D F F♯

3. Write under each of the following intervals its name :—



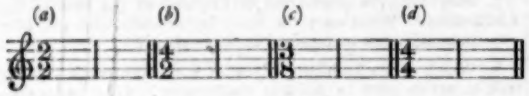
4. Write (1) the *supertonic* of F ; (2) the *sub-dominant* of E♭ ; (3) the *dominant* of B ; (4) the *leading note* of D ; (5) the *mediant* of E.

5. Transpose the following a minor third lower, namely, into the key of G :—

6. Add such sharps to the following scale as will make it into the key of B minor, with a major sixth and a sharp seventh :—

7. Fill up two measures or bars in each of the following times, introducing in each example a dotted note and a rest. Vary the contents of the two measures in each time.

(*a*) (*b*) (*c*) (*d*)

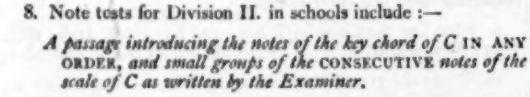


8. Note tests for Division II. in schools include :—

A passage introducing the notes of the key chord of C IN ANY ORDER, *and small groups of the* CONSECUTIVE *notes of the scale of C as written by the Examiner.*

Write a test of about 20 notes in accordance with these requirements. Write a semibreve for each note and do not add bars.

9. Re-write the following in $\frac{4}{4}$ time, *doubling* the value of every note and rest :—



10. Write out the melody of '*The Old Hundredth*' in the key of D, with a quaver for beat or pulse.

11. Describe the beating of time of (1) two beats, (2) three beats, (3) four beats in a bar. Draw diagrams.

12. State the meanings of the following terms :—*Pianissimo, Allegro, Adagio, M.* 60, and give the Italian equivalents for—*Increasing the pace, Gradually slower, Go to the commencement.*

TONIC SOL-FA NOTATION.

1. Write the following notes one octave lower :—

m' s' r' f' l m' r' s d' f' m' r' l t d'.

2. Name (as major sixth, &c.) the following intervals :—

(*a*) **f** to **t** ; (*b*) **s** to **ta** ; (*c*) $\mathbf{t_1}$ to **m** ; (*d*) **r** to **fe** ; (*e*) **fe** to **d'**.

3. What is the name (*a*) for **doh** sharp ; (*b*) for **lah** flat ; (*c*) for **fah** sharp ? (*d*) Re-write the following on the imperfect method (*i.e.*, without change of key) :—

Doh is C. f.F. C.t.

d m r ᶠd m f t r ᵐl t d'.

4. Re-write the following passages on the perfect method. Regard the first note in (*a*) as **me**, and the first note in (*b*) as **soh** :—

(*a*) **l ta s f d' ta s m d' r' ta l s m f.**

(*b*) **r s fe l r d $\mathbf{t_1}$ fe s l fe r m fe s.**

5. Re-write the following, doubling the value of each note and rest (*i.e.*, write in two pulses what is here given in one pulse) :—

| s :- .s,f | m .,r : d .$\mathbf{t_1}$ | d .r : m | r ,m.f : m .- ||

6. Name the kinds of measure formed by the following pulse signs :—

(*a*) **:s | l .s : f .m | r :- .m | d ||**

(*b*) **| :s | — : | m :- .,m | d : ||**

(*c*) **| m :- .d : f | m :- .s : l .s | f,m.r : d :- ||**

7. Write an ascending minor scale in three forms.

8. Note tests for Division II. in schools include :—

A passage introducing the tones of the **Doh** *chord in any order, and the other tones of the scale in stepwise succession.*

Write a test of about 20 notes in accordance with these requirements. Bars or accents need not be inserted.

9. Describe the mental effects of (*a*) **fah** ; (*b*) **lah** ; (*c*) **me** ; (*d*) **te**.

10. Write out the melody of the 'Old Hundred,' correct both as to time and tune.

11. Describe the beating of time, with diagrams, of two pulse, three pulse, and four pulse measure.

12. As in Old Notation Test.

Dictation and Handwriting.

(*Males and Females.*)

1. Write in *large hand*, as a specimen of Penmanship, the words—

William the Conqueror.

2. Write in small hand, as a specimen of Penmanship, the sentence—

This is the castled crag of Drachenfels.

N.B:—Candidates should not peruse the following passages until they have procured some friend to dictate it to them at a fair speed and in the divisions marked below.

3. (*Males only.*)

The theory of the Roman Empire | was that of a representative despotism. | The various offices of the Republic | were not annihilated, | but they were gradually concentrated | in a single man. | The senate was still ostensibly | the depository of sovereign power, | but became the mere creature of the emperor, | whose power was virtually uncontrolled. | The patricians were gradually depressed | or driven by the perils of public life | into orgies of private luxury. | The poor were conciliated, | not by an increase of liberty | or even of permanent prosperity, | but by gratuitous distributions of corn | and by public games; | while in order to invest themselves | with a sacred character, | the emperors adopted | the religious device | of an apotheosis.

3. (*Females only.*)

Down to the Restoration | it is to be wished | that every poet, however unworthy of the name, | should be preserved. | In the worst volume of elder date, | the historian may find something | to assist or direct his inquiries, | the antiquarian something | to elucidate what requires illustration, | the philologist something | to insert in the margin of his dictionary. | Time does more for books | than for wine ; | it gives worth to what originally was worthless. | Those of later date | must stand or fall | by their own merits, | because the sources of information, | since the introduction of newspapers, | periodical essays and magazines, | are so numerous | that if such books are not read for amusement | they will not be recurred to | for anything else. | The Restoration is the great epoch | in our annals, | both civil and literary.

EXAMINATIONAL ADVICE.

Our readers will not think that we have satisfactorily fulfilled our promises unless we act the part of a monitor until the very end, and conduct them not only to the preparation for, but through the examination itself to its conclusion.

We have done our endeavours to afford technical information, to ensure methodical preparation, to typify the kind of question, and even to suggest probable ones. In this latter respect we can only hope that our 1890 candidates will be as fortunate as those of last year.

By this time all the work should have been well done, and only dates, formulæ, lines of latitude and longitude should require attention.

The ensuing fortnight should be devoted mainly to exercise, easy revision, and answering our Test Papers.

Above all, during this period too much study, too much company, and too much nourishment should be religiously eschewed. Every athlete knows the evil of 'over-training,' and so does every experienced COACH.

Rather more, than less, sleep should be indulged in, and arrangements should be made that will obviate the necessity of travelling to and from the place of examination. The full importance of this last point is scarcely understood by anybody but those who have suffered from disregarding it.

All final preparations, such as the provision of large hand and map pens, black and red ink, blue, black and red pencils, penknife and india-rubber, should be made at once.

When the fateful day arrives the candidate should be present in good time, and without any books wherefrom he may '*cram*' up to the very door.

BEFORE work is commenced the 'Notice to Candidates' must be carefully perused, and all its directions implicitly obeyed; the information respecting Drawing and Science given; and the examination papers headed.

Despite line upon line and precept upon precept, year after year candidates fail through their papers remaining unidentified.

It is a good plan to work with a *watch* on the desk.

The ordeal having begun, good honest work should be the aim. Attempts to deceive the examiner by generalities, random shots, and pretended misunderstanding of the questions, should be avoided as worse than useless. They positively exasperate.

Given two papers of equal merit, that one that pleases the examiner best by giving him least trouble will assuredly get the more marks. This is simply human nature, to the influence of which even inspectors are subject.

The choice of questions should be determined by the following circumstances:—

1st.—Those that are compulsory.

2nd.—Those that are recommended.

3rd.—Those that can be best and most readily answered.

4th.—Those that can be graphically illustrated by maps or diagrams.

5th.—Those that demonstrate the candidates' practical knowledge of teaching.

Then, too, all things should be done with due deliberation and method, nothing hastily and unsystematically. Critically examine what the question really asks, and, if possible, what were the examiner's designs in asking it.

What cloudy obtuseness the most acute have displayed in examinations, what fearsome blunders they have perpetrated, and how the easy things outside the examination metamorphose themselves into hard ones within, bristling with unforeseen catches and difficulties!

Coolness and slowness are therefore essential, and to these the recommended punctuality, preparation, and sobriety of previous conduct will greatly conduce.

It should be remembered as an infallible antidote to the poison of 'flurry,' that if the work has been really prepared with the average amount of thoroughness, THE CANDIDATE MUST PASS unless he betray himself.

What kind of answer shall I write, tabulated or extended? This query should precede every reply. Every answer should be tabulated which will either save room or display perspicacity or minimise the labour of the examiner.

Rough drafts on the 'scrap' paper should be first drawn up, then the answer should be written as far as possible in the allotted space (or very distinctly headed), there should be NO writing between lines, and the diagrams, maps, illustrations, etc., should be placed to the north-east of the answer.

Of course no time must be wasted, either by indecision, random shots, fragmentary answers, or through leaving early.

Two questions *well* answered will score more than three only fairly executed. If, after answering all that is possible, time still remain, it can all be utilised for revision or elaboration of maps, etc.; which latter should only be drawn at first with ordinary detail.

REVISION is most important. In Arithmetic, Mensuration, Algebra, Euclid, and in fact in anything where a subsequent process or result depends upon a preceding one, the steps should be checked as soon as set down, and where circumstances permit, by a different method. Any error then discovered can easily be rectified. A final revision is also imperative.

During intervals, either at noon or night, answers should not be compared, but exercise should be taken and unexciting diversion indulged in. It is not necessary to request our candidates to avoid every appearance of evil, either by accepting or rendering surreptitious assistance.

Concluding 'Our Certificate Class,' we now with hearty sympathy wish our Pupils all success, both examinationally and hereafter professionally.

ANSWERS TO CORRESPONDENTS.

P. W. (Brentford).—(1) Not except by special permission, which will however probably be given. (2) You can sit at Xmas 1891.

A. L. (Lincoln).—There will be no difficulty. Your last school.

MISTRESS (S. Lawrence, Manchester).—Your note is very encouraging.

J. O. N. (Dover), J. B. (Faversham).—(1) Doubtless referring to Hamlet's father and Duncan. Claudius Cæsar was poisoned by his wife Agrippina. Richard III. was said to be haunted by the ghosts of the young princes. (2) Space will not permit. (3) See Model Answers to Certificate Questions. (4) The ratio of oxen to cows is as 3 to 2; therefore, the oxen are $\frac{3}{5}$ of 125 or 75, and the cows 50. Taking away £25 from £2575 we have left £2550, half of which + £25 is the price of 75 oxen, etc.

H. F. (Wigan).—There is no better book than Pendlebury's, either as regards type, matter, or gradation.

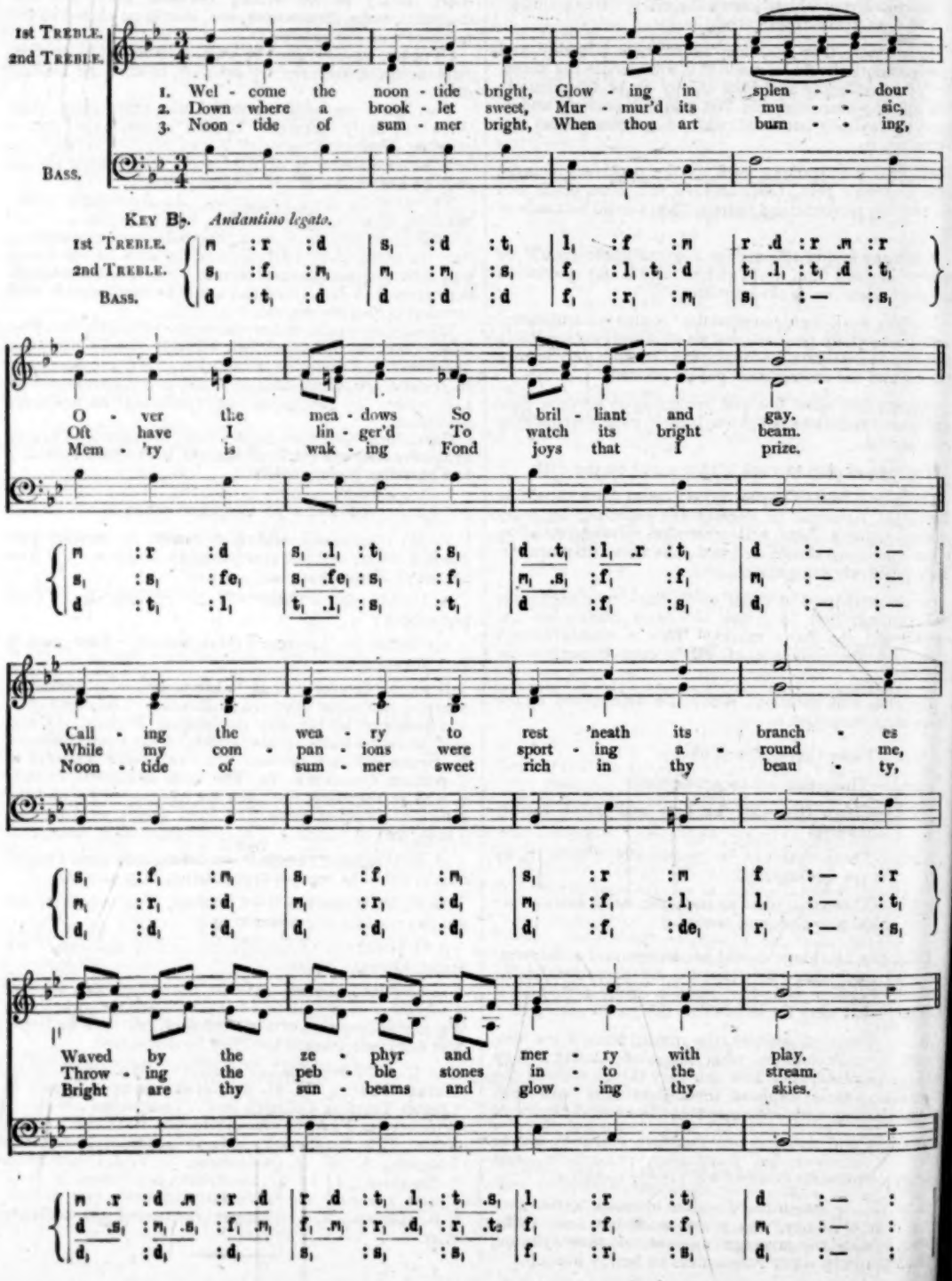
M. E. W. (Gateshead).—Certainly, it is required; but are you not late in commencing?

S. G. (Dearne).—From Messrs. G. Bell and Son, York Street, Covent Garden.

L. U. (Queensberry).—We do not believe one word of it. Another correspondent has mentioned the same thing. We are no praisers of their industry, but such an impudent fabrication would infallibly be discovered.

A. C. T. (Brighton), TIMOROUS (Wakefield), ADA (Market Rasen), W. H. R. (Newcastle-upon-Tyne), M (Chester Training College), B. F. (Todmorden), W. U. L. (Winchester), F. A. H. (Axminster), S. P. (Perth), GERM (Aston), F. R. T. (Kendal), L. K. (Wednesbury), DUBIOUS (Longton), A. W. D. (Aylesford), X. Y. Z. (Yarmouth), P. (Swansea), I. F. T. (Stockfield), two letters, E. J. G. (Upper Bangor), W. B. (Hurstpierpoint), two letters, H.B. (Clifton), T. C. (Kippax), answered per ordinary letter.

WELCOME THE NOONTIDE.

Andantino legato. *Tune*:—'LORD MAYOR'S DELIGHT.'

1st TREBLE.
2nd TREBLE.
BASS.
1. Wel - come the noon - tide bright, Glow - ing in splen - - dour
2. Down where a brook - let sweet, Mur - mur'd its mu - - sic,
3. Noon - tide of sum - mer bright, When thou art burn - - ing,
KEY B♭. Andantino legato.
1st TREBLE.
2nd TREBLE.
BASS.
O - ver the mea - dows So bril - liant and gay.
Oft have I lin - ger'd To watch its bright beam.
Mem - 'ry is wak - ing Fond joys that I prize.
Call - ing the wea - ry to rest 'neath its branch - es
While my com - pan - ions were sport - ing a - round me,
Noon - tide of sum - mer sweet rich in thy beau - ty,
Waved by the ze - phyr and mer - ry with play.
Throw - ing the peb - ble stones in - to the stream.
Bright are thy sun - beams and glow - ing thy skies.

Certificate Examination, 1889.

SECOND YEAR.

Domestic Economy.

1. Compare the values of beef, mutton, veal, poultry, and fish, under the heads of nutrition and economy.

(*a*) *Beef*, when properly cooked, is a most satisfying and nutritious food. It contains a large quantity of nitrogen and more iron than is found in most kinds of animal foods. The round contains the greatest quantities of lean fibre, and therefore the greatest amount of nourishment.

It is generally a little cheaper than mutton. American beef is 1d. or 2d. per lb. cheaper than English. As beef is so satisfying it is one of the most economical of meats, especially if the boiling joints are utilised to make good nourishing broths and soups.

(*b*) *Mutton* is very nutritious, the leg, like the round of beef, containing most lean fibre, and therefore most nourishment. It is is especially adapted as suitable animal food for invalids, as it is much more easily digested than beef. Mutton is as inexpensive as any kind of animal food. The leg and loin are the highest priced, but, having little bone, they are the most economical joints.

(*c*) *Veal* forms a pleasant variety in our food, but it contains a large proportion of gelatine, which furnishes good stock for soups, but which is the least nutritious ingredient of flesh. It is not so easily digested as beef or mutton, and as it is high-priced too, is not a profitable meat.

(*d*) *Poultry* is nutritious, light, and easy of digestion. It is however, expensive, and can only be considered as a luxury when for people in good health, and as a *necessity* for invalids.

(*e*) *Fish* contains the same ingredients as butcher's meat, though not in the same proportions. There is a considerable quantity of albumen and fibrin, and in some instances of gelatine also, and the oily fish are all rich in fat. Fish is especially rich in brain and nerve-making elements.

Fish is an economical food, because the cheapest kinds are as a rule the most beneficial. Plaice, brill, haddock, and herrings are cheap, nutritive and wholesome.

2. Explain the terms incisors, trachea, insalivation, asphyxia, capillaries, automatic.

The *incisors* are the four front teeth. They have wide but, sharp chisel-like edges; hence they are called incisors or cutting teeth.

Trachea, a cartilaginous and membraneous tube which conveys the air into and out of the lungs—the windpipe.

Insalivation.—The secretion of the salivary glands mixed with that of the small glands of the mouth, forms a thin watery fluid, which has certain very peculiar properties. Its purpose is to turn starch into sugar. This operation is important, as starch is insoluble and useless as nutriment, while sugar is highly soluble and readily oxidable. Insalivation is a state of body caused by an excessive flow of this salivary fluid. It is generally owing to the taking of mercury into the system, and causes loosening of the teeth and other distresing results.

Asphyxia.—When a person is strangled, drowned, choked, or in any other way prevented from inspiring or expiring sufficiently pure atmospheric air, what is called *asphyxia* comes on. He grows black in the face, the veins become turgid, insensibility and convulsions set in, and death succeeds in a few moments.

Oxygen starvation and *carbonic acid poisoning*, each of which may be fatal in itself, are both at work together in a case of asphyxia.

Capillaries.—Almost all parts of the body are traversed by minute and close-set canals, which open into one another, so as to constitute a small meshed network, and confer on these parts a spongy texture. These canals or rather tubes are the capillaries, and contain the blood and moisture of the body, and comprise the blood vessels, nails, hair, the substance of the teeth, and the cartilages.

Automatic.—Those organs of the body are said to be automatic or self-acting and regulating, whose operations are not affected by the operation of the will. Thus the actions of the heart, the cilia and the bowels go on independently of any mental volition; but on such processes as respiration the will can act.

3. Point out some of the common faults of waste and ignorance in English cookery.

Cooking, left entirely to the care of careless and ignorant servants, must of necessity result in much waste. A scientific knowledge of the constituents of food, and the best means of extracting the most nutriment from the different articles of diet, is essential to the prevention of waste. Much of this should be obviated by the introduction of cookery lessons into our schools.

The French, with their '*pot au feu*,' teach us how to make savoury, digestable, and nourishing dishes of vegetables, bread, bones, trimmings, &c., which many English people consider useless, and either throw away or do not use as advantageously as they might. Much waste is caused by hurry and want of care in cooking, causing over-done and under-done meat and other food, rendering it unpalatable, perhaps partially, if not wholly, uneatable, and certainly indigestible.

Dripping, if well clarified and daily attended to, may be utilized for frying several times. This is often thrown away after once using, or spoiled for want of attention.

Vegetables especially are wasted; potatoes peeled, often times thickly, instead of being boiled in their skins; cabbages and cauliflowers come to table with their centres only utilized, whereas the outer leaves and stalks may be either boiled a longer time or used for soups.

Much is lost by ignorance of the method of cooking different joints of meat, as to which joint should be boiled and which roasted. Stewing and soup making is not sufficiently resorted to. The temperature at which meat should be cooked is also often overlooked. The want of good grates or stoves, and good cooking utensils is the source of much wasteful cooking among poor people, even when otherwise they are careful and anxious to be frugal.

4. Give recipes for varieties of milk puddings, with accurate directions as to the proper modes of preparation. What precautions are necessary in the care of milk.

1. *Plain Rice Pudding.*—Wash a small tea-cupful of rice, put it into a pie-dish with 1 quart of milk and a large tablespoonful of sugar, a very small piece of butter, and a little nutmeg. It may be baked in one hour, but is better if put in a slow oven, stirred occasionally for a time, and allowed to bake two hours.

Sago and Tapioca puddings are made in the same way as rice.

Maccaroni and Vermicelli puddings are also baked in the same way, but the maccaroni, &c., requires steeping first until tender in a portion of the milk.

2. *Corn flour pudding.*—Take a quart of milk and bring most of it to the boil. Mix two large tablespoonfuls of corn flour with the milk reserved from the quart. Add the boiling milk, stirring carefully all the time. Add sugar to taste, and allow the mixture to cool a little. Beat up and add two eggs. These must be added carefully or they may curd. Bake about ¾ hour or 1 hour. Flavouring may be added just before serving. This pudding may be put into a greased basin, covered with a floured cloth, and boiled 1½ hours. Batter pudding, boiled or baked, is made in the same manner, using plain flour. Arrow-root, ground-rice, semolina, &c., if used in the same way, make excellent milk puddings.

Milk should always be kept in a clean vessel, which must have been previously well scalded, or it will become sour or tainted.

In warm weather it is difficult to keep milk from turning sour, without a cool dairy or larder.

Scalding milk by letting it come nearly to the boiling point before putting away, helps to keep it. It should not be boiled or some of its most valuable ingredients will be spoiled.

A little bi-carbonate of soda added to fresh milk helps to prevent it from turning sour.

5. Mention the most suitable forms of nutriment for an invalid forbidden to take solid food.

Most foods suitable for invalids are composed principally of milk. Milk is food for 'babes,' and therefore suitable to persons whose strength is reduced and whose digestion is weak. In some cases milk quite pure is ordered by the doctors—either pure warmed milk, or milk and water.

Generally, however, a little arrowroot, corn flour, ground rice, tapioca, sago, semolina, oatmeal, groats, and patent prepared farnaceous foods, are employed with milk to make a light nourishing food. The choice of these will depend upon the nature of the patient's illness, and to a great extent upon the likes and dislikes. All these foods may be made by taking about a dessert spoonful

of either of the above, mixing smooth with a little milk, pouring on about half a pint of boiling milk, returning the mixture to the saucepan and boiling for about 5 or 10 minutes, stirring all the time. Sweeten and flavour to patient's taste.

When the disease has expended itself and stronger food is necessary, then good beef tea will be ordered. A pound of beef, cut very small, just covered with cold water, should be soaked for 1 hour, then placed in an inner saucepan and the water in the outer saucepan kept boiling for 1 hour. The beef tea will then be ready for use.

This tea may be varied a little by using a little lean mutton or veal with the beef, or by boiling a little celery as a flavouring.

Nicely seasoned chicken broth, mutton broth, and veal broth are suitable foods. They must be allowed to get cold so that every particle of fat may be removed before they are prepared for the patient. Calf foot jelly is light, pleasant, and strengthening. In addition to these, barley water, milk gruel, water gruel, apple tea, etc. will be required as beverages.

6. What qualities constitute the character of a good maid-servant? How may such qualities be best encouraged during school-life?

To state the qualities to be sought in a good servant would be to name the characteristics of every true and right-minded woman or girl, whatever may be her special walk in life.

1. A servant should be honest and truthful. Her position is always one of trust. She is admitted of necessity to the knowledge of many family affairs which do not concern anyone outside the house; she has the care of property valuable to its owners if not to others, and her first duty is to keep faith with those who trust her. In school, much of this will be taught by precept, as she will only be one among a number, but a good teacher will have individual children always before her, and their special characters will be her study.

2. A servant should be *punctual* and *methodical*, so that she may get through her work without unnecessary wear and tear of strength, and trial of patience to herself and others. In school she will be taught the motto, 'a time and place for everything and everything at its time and its place.' Many opportunities will arise, too, where she will receive practical lessons. Charge over her own books and other materials, and especially the constant daily routine which school rules enforce, should be useful in encouraging punctuality, regularity and methodical attendance to duty.

3. A servant should be *courteous* and *obliging*; respect to the teachers, thought and care for fellow scholars, gentleness of manner and voice, will all assist in securing a courteous and obliging disposition, and will make her path smoother, both with her employers and fellow servants.

4. She must be *neat* in person and *tidy* in all her habits. How much the whole style of dress, the mode of wearing the hair, and the general appearance have to do in making favourable or unfavourable impressions on others is well known to all thoughtful persons. Modesty of character (evinced generally by the dress) is the special shield of women of all classes. A teacher may not dictate the kind of dress to be worn by her scholars—it is the province of the parent to decide this point—but by neatness in her own person, praise of suitable dress in others, and gentle advice, much may be done to encourage this quality.

7. What are the principal constituents of bread? Distinguish the different kinds of flour. Add any remarks on 'short weight.'

(*a*) Flour, of which bread is made, contains *gluten*, which supplies the nitrogenous or flesh-forming food; *starch*, which furnishes carbonaceous or warmth-producing materials; an abundance of *fat* and *oil*; and *mineral substances* which provide bone-making and nutritive materials; ordinary bread contains nearly one-half its weight of water, partly derived from that existing in the flour, and partly from that added in making the dough. Yeast, salt, and sometimes potatoes are added. Bakers' bread frequently contains also a quantity of alum, which is added to enable inferior flour to be used.

(*b*) The different kinds of flour are:—Wheaten flour, which makes the best bread; oatmeal, used mostly for cakes, as it cannot be fermented and made spongy like wheaten flour; Barley flour which is sometimes made into bread, but is like oatmeal, not sufficiently glutinous to be properly fermented; Rice flour—mostly used in soups and puddings; and Indian corn. Indian meal, and wheaten flour, used in equal proportions, make good bread.

(*c*) The adulteration of flour by the addition of alum and other things detracts from the weight, and enables loaves to be sold having the same appearance as those of full weight. The law in the matter of 'weights and measures' compels the baker to weigh his bread not only when he is baking it but also when handing it to the customer. When buying bread the buyer may therefore claim his full weight of bread.

8. Give heads of general principles to be taught to a cooking class as preparatory to their practical application.

Most of these general principles will require to be taught as occasion arises. The first two heads—'Cook, and 'Kitchen,' may be dispensed with as general lessons, but the 'cooking' principles will be taught as each different dish is dealt with.

I. The Cook:

Good cooks must be very clean and tidy, with special attention to nails and hair; the latter must be firmly arranged.

She should wear thick boots, dresses with short skirts, sleeves that can be made short, and aprons, with bibs, to keep the dress clean. When cleaning fires, &c., the hair should be covered with some kind of cotton hood.

II. The Kitchen:

There must be 'a place for everything and everything in its place.' All utensils and materials for cooking must be neatly and tidily arranged that they may be easily found when required.

When deciding quantities of materials, care must be taken that such amounts be in stock as will not spoil in keeping.

All bottles, tins, &c., in which things are kept, must be labelled. Utensils should be made of suitable materials, kept clean and dry, and arranged so that the air may get to them to keep them untainted.

Grates and stoves must be kept free from dust and soot, both for cleanliness' sake and that the cooking may proceed without hindrance.

The ventilation of the kitchen, the proper method of lighting a fire, the cleaning of flues and arrangement of grate or stove; must be thoroughly explained.

III. Cooking:

The object of cooking is to change into wholesome nourishment substances that would otherwise be useless.

The great art of cooking is not to allow any of the good things to get out and be wasted during the cooking, and to make the food tender, so that the teeth can chop it up and make it digestible.

Such food must be chosen as can be afforded.

Such methods of cooking must be adopted as will be most economical. Boiling, baking, roasting, stewing, &c. Food must be cooked at the right heat (use of thermometer and economy of gentle cooking). A correct knowledge of the time required to cook the various kinds of food is necessary, as also the exact effect of the cooking on the different constituents of which the food is composed. Vegetables require careful washing and cooking in plenty of water.

Dripping should be clarified and often attended to. Puddings should always be placed in boiling water. Pudding cloths must be floured to prevent sticking. Pastry should not be allowed to stand, but be placed immediately in the oven.

General directions for milk puddings, invalid cookery, soup-making, &c., may be taught, but each will have its own special attention in its practical application.

9. Mention the ordinary causes of the beginning of fevers, and explain the practice of 'isolating' infectious cases.

1. Fevers are often the result of neglected colds.

2. Defective drainage causes the surrounding soil to become impregnated with stagnant water and foul sewage; the air blowing over this becomes saturated with poisonous gas, which, if breathed, causes fever-poisoning, and often a fever epidemic. Improvements in the drainage system have done much to reduce fever cases.

3. Fevers are often the result of infection, either by breathing the breath of the patient, or by coming in contact with the patient during the peeling process.

Fever hospitals are becoming general in towns, but where it is not practicable to send the patient to an hospital or other house, then 'isolation' must be secured at home in the following manner:—

1. Remove from the sick room all unnecessary furniture, carpets, curtains, and bed-hangings.

2. Place a sheet dipped in carbolic acid and water, or regularly sprinkled (kept damp) with Condy's Fluid and water, over the doorway to purify the air.

3. Place saucers or other open vessels with disinfectants in the sick room, and put disinfectants in all utensils used in the room.

4. Let in as much fresh air as possible without causing draughts, and keep a fire burning night and day in the room.

5. All linen used in the room should be disinfected before leaving the room.

6. No visitors should be allowed. If some member of the family is obliged to enter the room at all, the dress should be covered with a print slip, to be thrown off again before leaving the room.

7. The patient should have warm baths medicated with Condy's Fluid during convalescence.

8. When the patient is pronounced by the doctor to need isolation no longer, the room must be thoroughly disinfected with sulphur.

10. To what extent are shell-fish and preserved fruits useful articles of diet?

Shell-fish, with the exception of oysters, are generally considered indigestible articles of food. Lobsters and crabs contain a large proportion of brain nourishment, and to those who can digest them are to be highly recommended. Mussels are less safe than cockles, as they sometimes contain an unwholesome matter, which has occasionally proved fatal. Shrimps and prawns form a nice relish, and are much used for sauce.

Oysters are very nutritious, and to most people easy of digestion. They are said to contain enough pepsine (similar to gastric juice) to be self-digesting. Many persons who cannot eat uncooked oysters can take them scalloped, though they are then more difficult of digestion. When used for invalids they should be eaten without the beard or gills, and the hard muscle by which they are attached to the shell.

Preserved fruits are really substitutes in the winter for the fresh fruits when in season. Like other vegetables they possess anti-scorbutic properties of the highest value, and supply to the body a fair proportion of strength and warmth.

In France and Germany apples are pared, sliced, and strung together, and hung up for winter use, and many pleasant dishes are made from them. Black currants preserved contain an acid good for sore throats; raspberries made into vinegar furnish another agreeable and useful medicine for sore throat.

Raisins, currants, prunes, &c., when cooked, all are useful medicinally, and at least supply an agreeable variety in the winter for puddings and cakes.

Nearly all kinds of fruit may be converted into jelly or jam and used either with or as a substitute for butter, especially for children. Fruit may be bottled or otherwise preserved whole, by some methods, so as to be nearly equal to fresh fruit.

11. Describe the present facilities for investing small sums of money, mentioning both interest and security. Give instances of investments to be avoided on the ground of 'risk.'

1. The best place for investing small sums of money is the *Post Office Savings Bank*. The rate of interest is not high, being 6d. a year for every pound invested, but it is quite safe, as the Government is responsible for the whole amount.

Any person can deposit 1s. or a multiple of 1s. (to the extent of £30 in one year, or £150 in all) at any office in the United Kingdom upon any day (except Sunday) until 7 o'clock p.m. A person can save even a penny by buying a postage stamp and affixing it to a gratuitously supplied form, and depositing as a shilling twelve thus attached. The depositor may transfer the amount standing in his name into the name of any other person, and he may nominate any person to receive his deposits at his death. Any portion or the whole deposits may be withdrawn from any office in the United Kingdom, free of charge.

2. After (or before) reaching the £150 maximum, *Government Stock* or *Local Loans* may be purchased in amounts of not less than one shilling, or more than £300 on the whole; and even one shillingsworth of Stock can be sold. The dividends of such invested Stock will be duly accredited to the purchaser in his deposit-book.

Interest on the deposits is calculated at 2½ per cent., on the Stock at 2½ or 2¾ per cent., and on the loans at 3 per cent.

3. *Immediate or Deferred Annuities* of not less than £1, nor more than £100, can be purchased on the life of any person not less than five years old.

Insurances for £5 can be effected upon children between the ages of eight and 14 years, and for from £5 to £100 on lives between 14 and 65 years. Husband and wife may each purchase annuities or effect insurances.

A female aged 24 may secure a *deferred annuity* of £1 to commence at 60 (males at 54), by an annual payment for 36 years (males 30 years), of 4s. 4d. or by immediate payment of £5 4s. 11d. (males, £3 19s. 10d.).

The life of any person aged 21 may be *insured* for £10 by an annual payment of 4s. 4d., or by annual payment until 60 of 4s. 8d. or by immediate and single payment of £4 4s.

Other safe investments are Building Societies—interest 4 to 5 per cent.

Clubs and Benefit Societies, shares in Co-operative societies, &c., are other facilities for small savings.

As a rule, no investment promising too *high interest* is safe. Shares, except in well established railway, shipping, water and gas companies, are to be dealt with very cautiously. Shares in mines, though exceedingly profitable at times, are particularly fraught with danger, because the outlay for machinery and labour must be great, while it is quite possible that the mineral sought may not be found. The risk is usually great when any undertaking promises to pay more than 6 or 7 per cent. per annum.

12. What portion of income should as a rule be spent in house rent? Explain the nature of Building Societies, and of Fire and Life Insurance.

It is not easy to lay down any general rule as to what proportion of the income should be paid for rent and taxes. In the country one-eighth of the income may suffice; but in large towns, where land is dear, at least one-sixth will often have to be paid. Another point which makes it difficult to fix a rigid rule is, the more children there are in a family the larger the house required, while at the same time all other expenses are greater. As so much of the moral and physical well-being of persons depends upon the homes they dwell in, they should be persuaded to reduce less necessary expenses in order to obtain comfortable and healthy homes.

(*b*). *Building Societies* are established for raising a fund to help members, by periodical payments, to obtain house property for themselves. A member chooses a building, a surveyor of the Society values and purchases it in the member's name, who pays for it by instalments. The usual period of payment is thirteen years, a sum equal to 5 per cent. of the principal and 5 per cent. interest being paid every year. The Societies are also used as a convenient investment, and pay from 4 to 5 per cent. interest.

(*c*). *Fire Insurance* is a Society which for a yearly instalment varying from 1s. 6d. to 2s. 6d. will pay £100 in case of fire. Either the building or the furniture only may be insured. If a larger sum be insured the instalment will vary in proportion.

Life Insurance is a means of providing a fund for the survivors in case of death. By the payment of quarterly or yearly fees a certain sum from £50 to £1000 and upwards will be paid to relatives on the death of the member, or to the member himself at a certain age, generally 60 years. The earlier in life the Insurance is effected, the less is the premium—at the age of 20 a man may insure £100 for a payment of £1 16s. 2d., at 30 he must pay £2 7s. 6d. for the same sum.

Female Candidates.

SECOND YEAR.

English History.

Three hours allowed for this paper.

Candidates are permitted to answer *eight* questions only.

1. What progress in colonisation was made by England in the seventeenth century?

Virginia was partly settled (by Raleigh) from 1584 to 1603, Barbadoes in 1605, Bermuda 1609, Gambia and Gold Coast Districts 1618, Massachusetts 1620, New Brunswick, Nova Scotia, Prince Edward Isle, Newfoundland, St. Kitts, New Hampshire 1623, Nevis 1628, Bahamas 1629, Antigua and Montserrat 1632, Connecticut 1633, Maryland 1634, Rhode Island 1636, North Carolina 1650, St. Helena 1651, Jamaica 1655, Anguilla 1659, Delaware 1664, Virgin Isles 1665, Hudson's Bay Territory 1667, Honduras 1670, New York and New Jersey 1674, South Carolina 1680, Pennsylvania 1681.

2. Give short biographies of *any two* of these personages:—Strafford, Pym, Blake, Sir William Temple, Shaftesbury.

(*a*) *Strafford.*—Thomas Wentworth was by birth a Yorkshireman. He was educated at Cambridge, and after travelling for a time married Margaret, daughter of the Earl of Cumberland. In James I.'s reign he sat in two Parliaments, but did not come into prominence until 1627, when he was imprisoned for refusing to pay a forced loan. The next year, however, both from ambition and a dislike to extreme democracy, he accepted the overtures of Charles, and was created Baron Wentworth. Soon afterwards he became Viscount Wentworth, Lord President of the Council of the North, and a Privy Councillor.

Even Clarendon confesses that his acts in these capacities showed an utter contempt for the principles and safeguards of English liberty.

In 1633, being appointed Lord Deputy of Ireland, he initiated a vigorous policy which laid Ireland absolutely subject at the king's feet. When the Scots invaded England in 1640, he was summoned to take the command of the opposing army under the title of Earl of Strafford, but he was able to effect nothing on account of the distrust of the soldiery.

Whilst in Ireland he had elaborated a scheme called 'Thorough,' for making Charles absolute throughout his dominions; but in 1640 he was impeached by Pym, a bill of attainder condemning him to death was passed, Charles basely deserted him, and he was executed on Tower Hill in 1641.

(*b*) *Ashley, Earl of Shaftesbury*, assisted in bringing about the Restoration, and held important posts under Charles II. He was one of the famous Cabal Ministry, and became Lord Chancellor in 1672. In the following year the enmity of the Duke of York procured his dismissal, and thenceforward he became one of the leaders of the opposition. He encouraged the belief in Titus Oates' infamous fabrication. In 1679 he drew up and carried the all important Habeas Corpus Act, but his efforts to secure the crown for the Duke of Monmouth and to the exclusion of the Duke of York caused him to be accused of high treason. Although the bill was ignored, his life was in danger, and he fled to Holland, where he died in 1683.

3. Who were the authors of the following works:—'The Alchemist,' 'Histrio-Mastix,' 'Areopagitica,' 'Leviathan', 'Hudibras,' 'The Plain Dealer,' 'Absalom and Achitophel'? Sketch the life of one of these authors.

The Alchemist, Ben Jonson.
Histrio-Mastix, Prynne.
Areopagitica, Milton.
Leviathan, Hobbes.
Hudibras, Samuel Butler.
The Plain Dealer, Wycherley.
Absalom and Achitophel, Dryden.

John Milton was born in Bread Street, London, in 1608, and was educated first by Thomas Young, a Scotch Puritan minister, then at St. Paul's School, and lastly at Cambridge, which he entered at seventeen years of age. He proceeded to the M.A. Degree, but from conscientious scruples renounced the idea of entering the Church. Next he travelled abroad, visiting various celebrated men, and on his return established a school and commenced his prose writings, throwing himself into the thickest political and religious controversy. After Charles I.'s execution his writings procured him from Cromwell the diplomatic post of Latin Secretary. In 1653 he became totally blind. At the Restoration he was at first in considerable danger, several works of his being publicly burnt, but through the influence of Davenant he was soon included in the Act of Indemnity. During the Plague he retired to a cottage at Chalfont (Bucks), hired for him by his Quaker friend Elwood. Having shown to the latter the MS. of 'Paradise Lost,' he encouraged the poet to write 'Paradise Regained.'

Milton spent the last years of his life in lowly seclusion, and, dying in 1674, was buried in St. Giles', Cripplegate. He was thrice married—*first*, to Mary Powell, who died in 1653, leaving three daughters (who neglected their father during his decay); *second*, to Catherine Woodcock; *third*, to Elizabeth Minshull, who tenderly soothed his declining years. His first union was a stormy and unhappy one.

4. For what events are the following dates memorable:—1604, 1605, 1637, 1644, 1645, 1658, 1678, and 'the 3rd of September'?

1604. Hampton Court Conference.
1605. Gunpowder Plot.
1637. 'Stony Sunday.' The new Scotch Liturgy attempted to be introduced. The cotton manufacture commenced.
1644. Battles of Marston Moor, Nantwich and Newbury. Rival Royalist Parliament at Oxford.
1645. Execution of Laud, Self-denying Ordinance. Battles of Naseby and Philiphaugh.
1658. Death of Cromwell. Capture of Dunkirk.
1678. Titus Oates' Plot.
'3rd of September'—Cromwell's 'Lucky Day.' Battles of Dunbar, 1650; Worcester, 1651; Death of Cromwell, 1658.

5. Say all you know about *any two* of the following:—the Clarendon Code, the Triple Alliance, the Treaty of Dover, the Habeas Corpus Act, the Exclusion Bill.

(*a*) *The Clarendon Code* consisted of the Corporation Act (1661), the Act of Uniformity (1662), the Conventicle Act (1664), and the Five Mile Act (1665).

These were enacted against the Puritans and the Romanists, and it is greatly to the credit of the former that they frequently submitted to disabilities rather than further the Romanisation of the nation.

The Corporation Act required all municipal officers to take the Sacrament of the Lord's Supper according to the rites of the English church—to renounce the Solemn League and Covenant—and to swear that they believed it unlawful to take up arms against the king.

The Act of Uniformity required all clergymen to declare their assent to all contained in the Prayer Book, and compelled all schoolmasters to obtain a licence from the Bishop. About 2,000 clergymen declining to subscribe were ejected from their livings.

The Conventicle Act declared all meetings of more than five persons, except the household, for religious worship not according to the Prayer Book, seditious; and all attenders above sixteen years of age were for the first offence fined or imprisoned for three months; for the second, fined or imprisoned for six months, and for the third transported for seven years.

The Five Mile Act required all dissenting ministers to take an oath similar to that prescribed in the Corporation Act, and in case of refusal they were not to approach within five miles of any borough or place where they had preached, nor to act as schoolmasters, under a penalty of £40 and six months' imprisonment.

(*b*) *The Habeas Corpus Act* (1679) was passed chiefly through the instrumentality of the Earl of Shaftesbury. The chief provisions of the Bill are as follows:—

(1) That on complaint in writing from any person committed for any crime, the Lord Chancellor, or any of the twelve judges in vacation, shall award a Habeas Corpus for such prisoner, returnable immediately before any of the judges, and shall discharge the prisoner, if bailable, upon giving security to appear and answer to the accusation.

(2) That the prisoner shall be brought up within a limit not exceeding twenty days.

(3) That officers in any way evading the return shall for the first offence be fined £100, and for the second offence £200 to the party aggrieved, and shall be disabled to hold office.

(4) That no Englishman (except convicts) shall be sent prisoner beyond seas.

(5) That no person once delivered by Habeas Corpus shall be re-committed for the same offence.

This Act effectually prevented a prisoner being denied justice through being hidden away without trial, shifted beyond seas, or being vexatiously re-committed.

'Habeas Corpus' has been jocosely and not incorrectly rendered, 'You may have his carcase.'

6. Describe the relations between England and Ireland in the time of the Commonwealth.

After the execution of Charles I., Charles II. was proclaimed king in Ireland by the Marquis of Ormond, and only Dublin and Londonderry remained faithful to the Parliament.

Cromwell was appointed Lord Lieutenant, and crossed over to reduce the Royalists.

Meanwhile there had been fought the battle of Rathmines, near Dublin (1649), where the Royalists lost 5,000 men. Cromwell's first exploit was the siege of Drogheda (1649); this town was stormed and the garrison massacred. Next Wexford met with the same fate, and Cork and other towns surrendered in terror. Clonmel made a brave defence, but was at length taken. Cromwell then left the completion of the task to Ireton, who captured Limerick after a long siege.

In 1652 the Royalists and Romanists were deprived of large estates, which were given to English settlers and Cromwell's soldiers. In their hands the island rapidly improved.

From 1654 to 1659 Henry Cromwell, by his wise and energetic administration, did much to promote the prosperity and unity of the country.

In Barebones' Parliament, 1653, six Irish members sat, and by the 'Instrument of Government' (1653) Ireland was to be represented by thirty members.

7. Show that the latter half of the seventeenth century was a time of peculiar activity in scientific and physical research.

The Royal Society, founded in 1662, gave a powerful impetus to scientific and physical research. The following are the most noteworthy results:—

The steam engine was invented by the Marquis of Worcester (1683), and Savery improved it by the vacuum principle. The winnowing machine and Dutch loom were also introduced in William's reign.

Newton from 1667 until past the end of the seventeenth century made wonderful discoveries, such as the binomial theorem, the integral and differential calculus, the law of gravitation, the three laws of motion, and many other principles of optics, acoustics, etc. His 'Principia' stands out as the most important scientific work ever written.

Dr. Wallis, Christopher Wren and Huygens also discovered the laws that regulate the collision of bodies and the oscillation of the pendulum.

Otto Guericke invented the air-pump in 1654, and through Newton's discoveries concerning the spectrum of white light, great improvements were made in lenses.

8. Explain, as to a class of children, the meaning and allusions of the following passages:—

(*a*) He nothing common did or mean
Upon that memorable scene,
But with his keener eye
The axe's edge did try;
Nor called the Gods, with vulgar spite
To vindicate his helpless right,
But bowed his comely head
Down, as upon a bed.

ANDREW MARVELL.

(*b*) What murdered Wentworth and what exiled Hyde,
By kings protected, and to kings allied?
What but their wish indulged in courts to shine,
And power too great to keep or to resign.

JOHNSON—*Vanity of Human Wishes.*

(*c*) On the neck of crowned fortune proud
Hast reared God's trophies, and his work pursued,
While Darwen stream with blood of Scots imbrued,
And Dunbar field resounds thy praises loud,
And Worcester's laureat wreath.

MILTON.

(*d*) 'Nature and Nature's laws lay hid in night,
God said, "Let Newton be," and all was light.'

POPE.

(*a*) When Charles I. was executed he behaved with dignity, and, with an eye sharper than the decapitating axe, he drew his finger along the edge and said, 'This is a sharp cure for evils.' Then without invoking, as ordinary men would have done, divine vengeance upon his judges, he laid his head down upon the block as comfortably as if it had been his pillow.

(*b*) Ambition and desire of arbitrary power wrought the death of Strafford and the banishment of Clarendon. Charles I. especially declared that not a hair of Strafford's head should be injured, and James II. married Clarendon's daughter Anne.

(*c*) Cromwell is said to have fought God's battles, and defeated the Scots, under Leslie, at Dunbar, and the Royalists, under Charles II., at Worcester.

(*d*) Newton made such astounding discoveries in Mathematics, Astronomy, Optics, Acoustics, and physical science in general, that he illuminated Nature.

9. Contrast the position and influence of England with regard to foreign affairs under the Commonwealth and under Charles II., and account for the difference.

Under the Commonwealth an insignificant minority of Independents overawed the Puritans, repressed the Royalists, and conquered Scotland and Ireland. Their representative, Cromwell, wrested the supremacy of the sea from the Dutch, defeated the Spaniards in the West Indies, interposed on behalf of the Waldenses of Piedmont, and compelled the Dey of Algiers to liberate his Christian slaves. Cromwell was the arbiter of Europe.

Without doubt the foreign prestige of England dates from the time of the Commonwealth. In Charles II.'s time England bowed before Holland, whose guns were heard at London Bridge; Scotland and Ireland both retrograded, and England became the pensioner of France and the beggar from Portugal.

The difference is accounted for by the superiority of Cromwell to Charles, of the Puritans to the Restorers. Cromwell was an uncouth man, but wise and active; Charles was a fop, foolish, and indolent. Charles could turn compliments, but Cromwell could strike decisively.

The Puritans were narrow-minded and intolerant, but a considerable leaven of them were fanatically sincere, and were convinced that they were doing the Lord's work. They never turned their backs in the day of battle. The restorers of Charles II. were, like him, broad-minded; but it was the breadth of immorality. What religion they professed was hypocrisy, and they were in reality debauched atheists. They never faced a foe, but begged money from him.

10. 'The Puritans hated bear-baiting, not because it gave pain to the bear, but because it gave pleasure to the spectator.' Discuss this statement, and show how far you consider it to be a true, and how far an incomplete, description of the character of the Puritans.

The statement in the question is true as far as it goes, and errs more from being incomplete than inaccurate. If, however, this partial description pretends to be a thorough delineation of the Puritan character, its groundwork of truth only makes it the more condemnable.

The Puritans lived in a rough age, when there was severe work to do. They felt the high heights upon which they lived, and the stern deeds they had to perform. With them was no room for levity, no time even for innocent sports, much less for those diversions which tortured dumb creatures.

Every extreme leads to its opposite, and the frivolity and inanity of James I.'s court produced in the minds of 'the Saints' the opposing excess. Man had to save his soul, man was born to sorrow for his sins, and thus all innocent amusements were prohibited by them on account of the pleasure afforded, because pleasure had been the sole aim of the previous decade.

11. Mention the chief contemporary authorities for the history of the Stuart period, and also any works of fiction which illustrate that history.

James I.'s Works, Milton's Works, Bacon's Writings, the Calendars of State Papers, the Commons' Journals, Laud's Diary, Pepys' Diary, Evelyn's Diary, Burnet's History, and Clarendon's History are the chief contemporary authorities.

Kingsley's 'Westward Ho!' Scott's 'Fortunes of Nigel' and 'Peveril of the Peak,' Mrs. Hall's 'Buccaneer,' and Thackeray's 'Esmond' throw great light upon the principal characters and manners of the period.

12. What was the condition of England at the close of the Stuart period in regard to the means of locomotion? Give particulars respecting any manufactures that have changed their locality since that time.

(*a*) The means of locomotion were simply despicable. Apart from the old Roman roads the ways were veritable sloughs of despond, canals and railroads there were none, and the deep ruts and the muddy abysses of thoroughfares will partially account for sedan chairs and successful highwaymen.

(*b*) The woollen manufacture in the time of the Stuarts was in Pembrokeshire and Norfolk, Norwich being the most important centre. The products of the West of England and Yorkshire were relatively insignificant. The iron manufacture was chiefly carried on in the south, particularly in Sussex. The silk manufacture was confined to London, and a little cotton was made in the south-west.

13. Who were the chief dramatic writers in the time of Charles II.? What were the general characteristics and influence of the drama in that period?

(*a*) The chief dramatists between 1660 and 1685 were Dryden, Wycherley, Otway and Congreve.

(*b*) The influence of the drama was vicious in the extreme, immorality being openly applauded and virtue scoffed at. Otherwise the plots are ingenious, and the language lively and sparkling, calculated to brighten and render sprightly and polite its hearers.

14. What were the provisions of the Declaration of Rights? Give instances of the violation of any of these rights by the Stuart kings.

The Declaration of Rights (1689) declared that (1) the king has no power to suspend or to dispense with laws, (2) royal courts are illegal, (3) subjects have a right to petition the king, (4) the elections for parliament and speech in parliament are free, (5) excessive bail, fines, punishments, &c., must not be inflicted, (6) juries must not be packed, (7) that every sovereign should neither be a Papist nor marry a Papist.

James II. issued a 'Declaration of Indulgence' (1687); James I. and Charles I. made cruel use of the Courts of High Commission and Star Chamber; James II. prosecuted the 'Seven Bishops' for petitioning him; James I. and Charles I. cruelly punished the Puritans by mutilation and ruinous fines; Charles II. and James II. packed juries, and procured the deaths of Russell, Sidney, and many others in the south-west; Charles I., Charles II., and James II. all married Papists; Charles II. and James II. were themselves Romanists.

15. Name any famous buildings which were erected in England during the seventeenth century, and tell what you know about their the architects. Say what particulars the style of building differed from that of an earlier period.

At the beginning of the seventeenth century that branch of architectural style called the Tudor, a variation of the Perpendicular, prevailed, but then it was gradually displaced by that branch of the Renaissance, or revival of ancient Roman architecture, which is known among us as the Elizabethan. In general, this mode, from its right angles and entablatures, is more convenient, and fits better with the distribution of our edifices than the pointed and irregular characteristics of the earlier Gothic. In more imposing buildings the dome, which is distinctly classic, marks out this period.

In the reign of Charles I. Inigo Jones designed, among other buildings, St. Paul's at Covent Garden, and Greenwich Hospital, in a peculiar style imitating the Græco-Roman, Architecture, neglected under the Commonwealth, revived after the Restoration, when Sir Christopher Wren designed an immense number of buildings, particularly St. Paul's, the towers of Westminster, the Sheldonian Theatre at Oxford, Chelsea Hospital, &c. Other architects of his time were not less productive. Among them were Gibbs and Sir John Vanbrugh.

Female Candidates.

FIRST YEAR.

Geography.

(Three *hours allowed for this paper.*)

Candidates may answer only EIGHT questions.

[Small sketch-maps or diagrams may be drawn to illustrate any answer, at the candidate's discretion.]

1. Explain carefully how the seasons are caused, and give the exact meaning of the terms—Equinox, Tropic, Solstice.

The seasons are caused through what is termed the parallelism and inclination of the earth's axis, and the world's annual revolution round the sun. If the axis were perpendicular to the plan of its orbit, that is to the plane of the ecliptic, it is evident that the length of days and nights would be equal all the year round on every part of the earth's surface.

But the axis of the earth is inclined 23½° out of the perpendicular and points always towards the same fixed star. Consequently it is sometimes inclined to the radius of its orbit 66½°, then in three months it is at right angles to its radius, in another three months it is inclined away from its radius 113½°, and in another three months it is again at right angles to the radius but on the opposite side of the orbit.

DIAGRAM OF THE SEASONS,

Such as on p. 24 of Moffatt and Paige's New Geography.

Thus at A it is Summer in the Northern Hemisphere, for the inclination of the axis towards the sun causes that hemisphere to have longer days than nights, and also to receive the sun's rays more directly.

In the Southern Hemisphere it is Winter, for there the inclination away from the sun makes the nights longer than the days, and the rays of the sun to fall obliquely.

At C the axis is neither turned *to* nor *from* the sun; the result is equal days and nights, and a temperate season in both hemispheres. Precisely the same thing happens at D.

At B the Northern Hemisphere is affected just as the Southern one was at A.

Equinox (L. *æquus*=equal, *nox*=night), a time when the days and nights are equal all over the world. There are two—the Vernal Equinox on the 21st March, and the Autumnal Equinox on the 22nd September.

Tropic (Gr. *trepo*=I turn) is so called because it is a point marking the limits of the sun's apparent path. In the plural, '*tropics*,' it means those regions of the earth (around the equator) within which the sun at some time or other during the year appears vertical. (See Solstice.)

Solstice (L. *sol*=sun, *sto*=I stand) is either one of the two times when the sun appears to stop in his northward or southward course before turning in the opposite direction. There are two Solstices—the Summer Solstice, June 21st, when the sun is vertical at the tropic of Cancer, before turning southward; and the Winter Solstice, 22nd December, when the sun has reached its most southerly limit, and is vertical at the Tropic of Capricorn.

[Any-one who wishes thoroughly to understand the Seasons should experiment with a Tellurium, and should also reason what would be the results if (*a*) the inclination of the axis were preserved, but its parallelism destroyed; (*b*) the axis were in the plane of the orbit.]

2. What is the Atmosphere? and what is its pressure at the sea-level? Explain the terms Density and Evaporation. How is the moisture condensed into clouds? and why is rain more frequent in the Temperate than in the Torrid Zone?

(*a*) The thin fluid or gaseous envelope of the air is called its *Atmosphere* (Gr. *atmos* = vapour, and *sphaira* = a sphere).

(*b*) Its *pressure* at the sea level is 14·73 lbs. per square inch.

(*c*) The *Density* of the atmosphere (as of any other substance) depends upon the number of ultimate particles in any given mass. Air being elastic, the density of its lower strata is vastly greater than of its upper.

(*d*) *Evaporation* is the turning of any substance into a gaseous state from a fluid by means of heat. Of course water is most commonly subject to this change, and in fact it is always going on.

(*e*) When the air is saturated with vapour it becomes denser, and in time, meeting with cold currents of air, its vapour is converted into cloud. A cloud consists of a mixture of liquid particles and vapour, and at once begins to descend, but it is often re-vaporised before it can fall as rain.

(*f*) Rain is more frequent in the temperate than in the torrid zone because of the more frequent variations of temperature, which cause condensation to take place oftener. Much vapour is carried from the torrid zone to be precipitated in temperate and polar regions. The amount must not be confused with the frequency of rain.

3. Distinguish between Trade Winds, Cyclones, Monsoons, and state why each is so-called. Explain the causes of currents, mentioning what you know about the Labrador and Peruvian currents. Compare the height of spring-tide in the Bay of Fundy and the Mediterranean Sea, and account for the difference.

(*a*) *The Trade Winds* are so called because of the great advantage that navigators derive from the regularity of their course and action. All winds are caused by disturbances of temperature. Heat expands the air, makes it lighter, and causes it to ascend. Thus at the equator warm air is constantly rising, and its place as constantly being taken by cold air rushing in from the north and south.

But since the rotary motion of the earth from west to east is greatest at the equator, and is nothing at the very poles—and since the enveloping air partakes of the earth's motion, it follows that the air moves from west to east very much more slowly in high than in low latitudes. Therefore the cold

currents flowing towards the equator move more slowly than a spot on the equator, and apparently and relatively more from east to west as well as from north to south. Thus the north trade is a north-east wind, and the south trade a south-east wind.

(*b*) *Cyclones* (Gr. *kuklos* = a circle) are hurricanes which blow with a rotary and onward movement. They are caused by the circular motion of the air from a region of low to one of high pressure.

(*c*) *Monsoons* (Arabic *mausaan* = season). When the sun is north of the equator Asia becomes greatly heated, and a vast current of air from the cooler regions of Africa sets in from the south-west. When the sun crosses to the south of the equator the wind then blows from the north-east, as explained in '*Trade Winds*.'

Hence from April to October the S.W. monsoon prevails in the Indian Ocean, and is succeeded by the N.E. monsoon, which blows from October to April.

(*d*) *Currents have three principal causes*—(1) Changes of temperature; (2) Force of winds; (3) The earth's rotary motion. Currents are caused by change of temperature in just the same way as winds (see above). Top currents are cooler than under-currents, and are often in a contrary direction. The force of prevailing winds exerts a great influence in modifying their direction; and the earth's rotary motion acts upon the water in the same way as upon the air.

(*e*) *The Labrador Current* flows from the Arctic Ocean down Baffin's Bay, and joins the Arctic Current off Cape Farewell.

(*f*) *The Peruvian Current* is a branch of the Great Equatorial Current that flows from the Antarctic Ocean N.E. across the Pacific until it reaches the W. coast of America at about 45° S. latitude. Here it divides into two branches, the larger flowing along the coasts of Chili and Peru till it reaches the equator, when it trends W. across the Pacific.

(*g*) The height of the tide in the Mediterranean Sea differs greatly according to the locality. Along the open coast it is often not more than a few inches, but in the Adriatic and some African inlets it reaches six feet.

This comparative absence of tide is chiefly accounted for by its land-locked entrance. In the Bay of Fundy a rise of more than one hundred feet has been registered. The general direction of the tidal wave is from E. to W., and the Bay of Fundy has a funnel-shaped opening. Thus the tidal wave generated in the vast expanse of the Atlantic rushes up the Bay of Fundy, and is, as it were, heaped up in the narrow parts.

4. Show, with illustrations, how climate is affected by (*a*) Latitude, (*b*) Marine currents, (*c*) Altitude. What is the mean temperature at the North Pole and Equator respectively? Explain the influence of climate on the national character of Negroes, Danes, and Spaniards.

(*a*) *Latitude* is distance north or south of the equator. Places near the equator receive the sun's rays more directly, and with less variation than those in high latitudes, and the climate is thus warmer, and as a rule more humid, owing to more frequent rainfalls (see question 2). The modification of climate through latitude is well shown by comparing Sumatra, Malacca, Southern China, Mongolia, etc.

(*b*) *Marine currents* render a climate more humid and more constant. Hot climates are cooled, and cold climates raised in warmth by them. The Gulf Stream raises the temperature of Western Europe, and the Peruvian Current tempers the heat of Chili and Peru.

(*c*) *Altitude.* 'The higher we go the colder it gets.' Thus elevation greatly mitigates the heat of a tropical climate. The snowcapped mountains of low latitude exhibit from the base to the summit every variety of climate. At Quito, on the Equator, which is situated at an elevation of 9,500 feet, the climate is fairly temperate, whilst along the Amazon the heat is almost intolerable. The average fall in temperature is 1° F. for every 300 feet of elevation.

(*d*) The mean annual temperature at the equator is 80°. At the North Pole it has been variously estimated as from zero to 20° F., but it is only a matter of scientific speculation, as no one has ever reached the pole. Probably it varies considerably for different years.

(*e*) Changed conditions of climate have made the negroes lazy, improvident, and immoral; and the Spaniards of South America indolent, treacherous, violent and bloodthirsty. The Danes have not been deleteriously affected, but rather improved.

5. In what parts of the world would you find the following plants and animals:—bananas, lichens, tobacco, hemp, kangaroos, reindeer, tapirs, giraffes, chamois, and alligators?

Bananas are found in Hindostan; *lichens* in high latitudes or altitudes; *tobacco* in south of United States, West India Islands, etc.; *hemp*, Russia and India; *kangaroos*, Australia; *reindeer*, Lapland and Norway; *tapirs* in South America; *giraffes*, South Africa; *chamois*, the Alps; *alligators*, North and South America.

6. 'The continuous series of mountains along the north of the Mediterranean peninsulas has a very important effect on the climate and vegetation of this region.' Explain and illustrate this statement.

Three peninsulas run southwards into the Mediterranean—Spain (sometimes called *the* peninsula), Italy, and the Balkan peninsula. In the extreme N.W. of Spain are the mountains of Asturias; to their east, the Pyrenees. North of Italy are the various branches of the Alps, and north of Roumelia are the Balkans. These mountains ward off the cold breezes from the north and give the peninsula southern aspects, and considerably raise the temperature. They intercept also the rain-clouds from the Mediterranean and render the climate more moist. The vegetation is rendered more luxuriant, and is much more southern in its character than any other extensive region equally distant from the equator.

7. Give an account of France, *or* of European Russia, under the following heads:—

(*a*) Size and population.
(*b*) Form of Government.
(*c*) Chief manufacturing towns and industries.
(*d*) Principal rivers and mountain ranges.
(*e*) Chief seaports and harbours.

FRANCE.

(*a*) *Size*, etc. Length 650 miles, breadth 600 miles, area 200,000 square miles. Population 37½ millions.

(*b*) *Form of Government.* Republican, under a President. The legislative assembly consists of two houses—a Chamber of Deputies, elected by universal suffrage, and a Senate, elected by delegates chosen by the municipalities.

(*c*) *Manufacturing towns and Industries.* Brandy, at Cognac; Silk, at Lyons, Paris, Nimes, etc.; Woollen, at Rouen, Amiens, Louviers, etc.; Linen Goods, St. Quentin, Valenciennes, Cambray; Cotton, Rouen, Lille, Cambray; Hardware, S. Etienne; Wine, in most parts of the country.

(*d*) *Principal Rivers and Mountain Ranges.* The Alps, between France and Italy; Jura Mountains, between France and Switzerland; Pyrenees, between France and Spain; the Cevennes, running from N. to S. to the W. of the Rhone basin, 5,000 ft. high; Auvergne Mts., 6,000 feet high, to the W. of the Cevennes; the Vosges, 4,500 feet high, between France and Germany.

France is well watered, the principal rivers being the Seine, Loire, Garonne and Rhone.

The Seine is 470 miles long; rises in the table-land of Langres. Tributaries—Aube, Marne, Oise and Yonne; flows into English Channel.

The Loire is 600 miles long; rises in Cevennes Mountains, drains central France. Tributaries—Mayenne, Allier, Oher; flows into Bay of Biscay.

The Garonne is 360 miles long; rises in the Pyrenees, drains South West France. Its Estuary is called the Gironde, it flows into the Bay of Biscay. Tributaries—Tarn, Lot, Dordogne.

The Rhine is 530 miles long, rises in the Alps, flows through Lake Geneva into France. At Lyons it is joined by the Saone, which flows south from the Vosges. Then the Rhine flows south into the Gulf of Lyons. Tributaries—Saone, Isere Durance.

(*e*) *Chief seaports and harbours.*

Commercial Ports—Paris, Lyons, Marseilles, Bordeaux, Nantes, Havre, Calais Boulogne.

Naval Ports—Toulon on Mediterranean coast, Brest in the north west, Cherbourg in the English Channel.

Harbours—Dunkirk, Calais, Boulogne, Mouths of Somme and Seine, Brest, Gironde, Marseilles, Toulon.

8. Give an account of a tour in Switzerland, stating how you would get there from London, and what you would be likely to see; *or*,

Describe a journey from Paris to Buda-Pesth.

8. A very interesting way of journeying from Paris to Buda-Pesth is to proceed via Metz, Strasbourg, Ratisbon and Vienna, thus making five stages. From Paris to Metz the country is flat, and would be uninteresting but for its vineyards. We cross neither river nor mountain. Metz is a fortress of the first rank, and was ceded to Germany in 1871. From Metz to Strasbourg we pass over ground repeatedly fertilised by human blood. Strasbourg is almost impregnable, and possesses a splendid Gothic cathedral with the highest spire in the world (466 feet). In this city we see much interesting clock work, surgical instruments, and best of all *pâtés-de-foies-gras*. We are now 250 miles from Paris. Next, crossing the Rhine, which is about a mile away, we take train for Ratisbon in Bavaria, which is on the right bank of the Danube, through a noted wine country and over the watershed which separates the Danube from the Rhine. In Ratisbon is a beautiful bridge, 1100 feet long. The Danube is here navigable, so we take steamboat for Vienna, and soon enter the Austro-Hungarian Empire. Descending the stream we pass on our right the confluences of the Isar, the Inn, and the Ens, and through the most picturesque scenery until we reach Vienna. We are now 650 miles from Paris. Vienna is perhaps the gayest city in the world, and its streets are the more striking from the mixed nationalities met with. The Prater Park, situated between two arms of the Danube and containing nearly 8 square miles, is perhaps the finest in Europe. In the Cathedral of S. Sophia is a bell weighing 18 tons. Getting afloat once more, and passing on the left the confluence of the March, we reach Pressburg, below which place, the river runs with great velocity, is crowded with islands and flows between ever-varying banks. In this portion of its course it also sends off numerous arms, which enclose large tracts of country. Forty miles north of Buda-Pesth the river changes its easterly course for one nearly due south. The country here (Hungary) is rich in minerals, flocks and herds and wines. Buda is on the west bank and Pesth on the right, and reaching here we are 133 miles from Vienna and 780 from Paris.

9. Trace (either by description or by means of a sketch-map) the course of *one* of these rivers: Tagus, Elbe, Volga.

(This should be answered by the sketch map as being far preferable to verbal description.)

10. State what you know about any *six* of the following:—Donegal, Adrianople, Valencia, Zealand, Messina, Bremen, Cherbourg, Belgrade, Kertch, Cannes, Morea, and Prague.

(*a*) *Donegal* — a maritime north-west county of Ireland, the most mountainous in the country. It is washed on the east by Donegal Bay, and its county-town is Lifford, which has displaced the town of Donegal.

(*b*) *Adrianople* is an ancient and important city situated on the Maritza about 130 miles W.N.W. from Constantinople.

(*c*) *Valencia*, a small Island off the S.W. of Ireland, is in Kerry county and contains the starting place of the Atlantic cable to Newfoundland.

(*d*) *Zealand* is the largest of the Danish Islands between the Cattegat and the Baltic. It is separated from Sweden by the Sound and contains the strong fortress Elsinore and the Danish capital Copenhagen.

(*e*) *Messina*, a strait separating Italy and Sicily, has a length of 20 miles, and a breadth varying from 2 miles to 11 miles. The town Messina is on its Sicilian shore.

(*f*) Bremen, a free city of Germany, is on the Weser, about 50 miles from its mouth. It lies in its only small territory of 98 square miles. The town Bremerhaven, at the mouth of the river, is an appendage. After Hamburg it is the greatest German port. It has also important manufactures of iron, tobacco, sugar, rope, etc.

11. In what parts of Europe would you find the Fins, Czecks, Basques, and Slavs? What title is given to the head of the Government in Portugal, Switzerland, Russia, Denmark, and Turkey?

(*a*) We find the Fins in N.W. Russia, the Czecks in Bohemia, the Slavs in S. and Central Russia and part of Austria, the Basques in N. Spain.

(*b*) The head of the government is called in Portugal, king; in Switzerland, the President; in Russia, the Czar; in Denmark, king; in Turkey, the Sultan.

12. Draw in a square an outline map of Italy and Sicily, marking the chief rivers, towns, and mountain ranges. Add the lines of latitude and longitude, and a scale of miles.

(May easily be drawn from any good atlas.)

Male and Female Candidates.

SECOND YEAR.

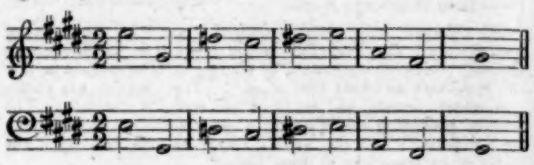
Music.

(TWO *hours allowed for this paper.*)

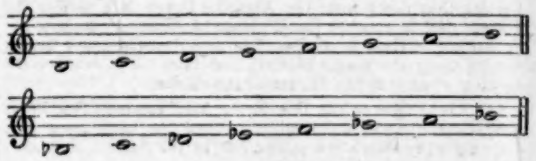
Candidates may answer the questions in either the Staff Notation or the Tonic Sol-fa, but *not both*. The questions in the Tonic Sol-fa Notation will be found at the end. You are not permitted to answer more than NINE questions.

STAFF NOTATION.

1. Write the following in the Bass clef (adding the key signature) *two* octaves lower:

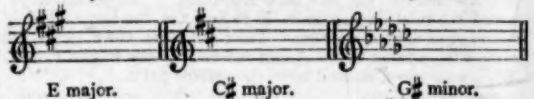


2. Add flats to such notes in the following scale as will make it into the scale of B♭ minor, with a minor sixth and a major seventh:

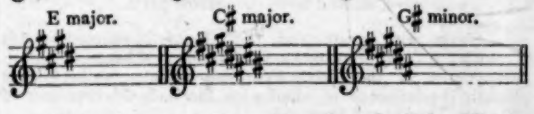


3. Write the signatures of the following keys:

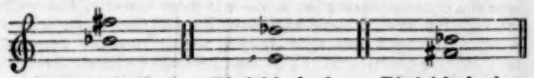
A major. B minor. E♭ minor.



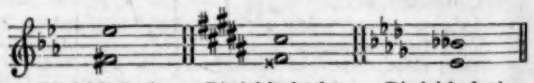
E major. C♯ major. G♯ minor.



4. Write the names (as major 3rd, etc.) of the following intervals:

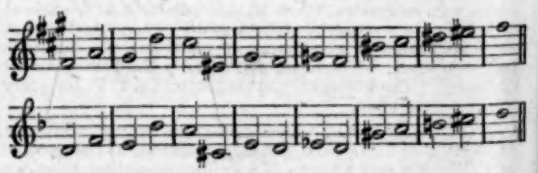


Augmented 5th. Diminished 7th. Diminished 4th.



Diminished 7th. Diminished 5th. Diminished 5th.

5. Transpose the following a major third lower, *i.e.*, from F♯ minor to D minor:

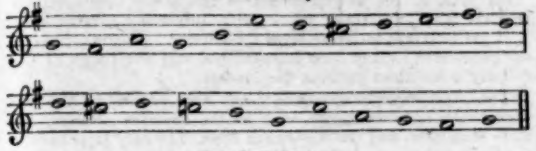


6. Note tests for Division IV. in schools include:

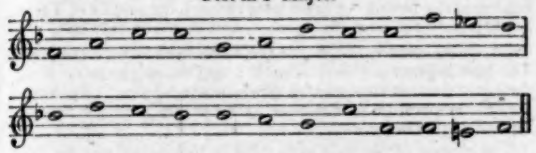
A simple passage, in a major key, containing a modulation into the key of the fifth above (by raising the fourth degree), or the key of the fifth below (by flattening the seventh degree).

Write two passages, one in G major and one in F major of about twenty notes each, in accordance with these requirements. Write a semibreve for each note and do not add bars.

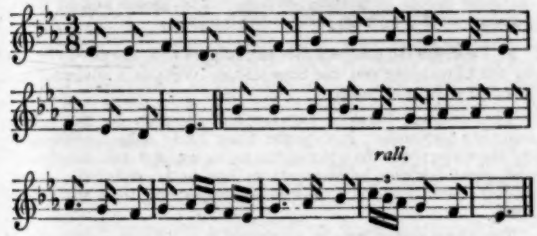
Test in G Major.



Test in F Major.



7. Write out the melody of 'God Save the Queen' in the Key of E♭, with a quaver for a beat or pulse.

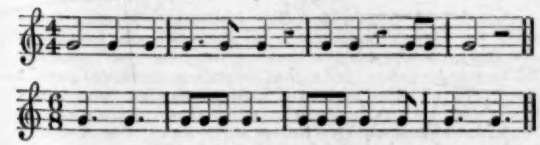


8. Time tests for Division IV. in schools include :

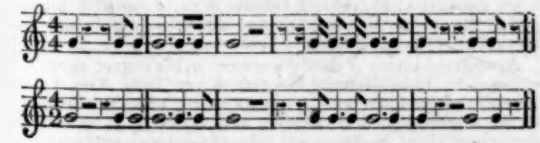
One or more series of notes and rests, in $\frac{2}{2}$, $\frac{4}{4}$, $\frac{8}{8}$, *and* $\frac{3}{4}$ *times, which may include dotted minims and dotted crotchets; also a* SIMPLE *phrase in* $\frac{9}{8}$ *time (counting two beats in a bar).*

Write two passages, one in $\frac{4}{4}$ time and one in $\frac{9}{8}$ time, of four bars each, in accordance with these requirements. Use no rests shorter than a crotchet, and no notes shorter than a quaver.

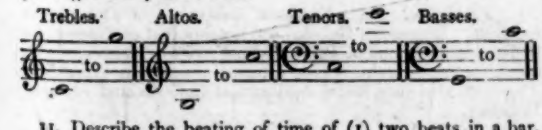
Write on G (the second line) throughout.



Re-write the following in $\frac{4}{2}$ time, doubling the value of every note and rest :



10. State the average compass of Trebles (adults), Altos (adults), Tenors, and Basses.



11. Describe the beating of time of (1) two beats in a bar, (2) three beats in a bar, (3) four beats in a bar.

(1) | DOWN *Up* |

(2) | DOWN Right *Up* | or | DOWN Left *Up* |

(3) | DOWN *Left* Right *Up* |

12. State the meanings of the following terms :

(1)	A tempo.	In (strict) time.
(2)	Ad libitum.	At pleasure.
(3)	Adagio.	Very slow.
(4)	Dal Segno.	Repeat from the sign, 𝄋
(5)	Grazioso.	In a graceful flowing style.
(6)	Calando.	Dying away = softer and slower.

TONIC SOL-FA NOTATION.

1. The tones l_1 t_1 se_1 l_1 are the relative minor for d' r t_1 d of the major key. What tones in the relative minor correspond to the following passage in the major?

Major :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
d	s	m	f	r	m	d	d^1	m	s	t_1	r	f	m	r	d

Relative minor :

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
l_1	m	d	r	t_1	d	l_1	l	d	m	se_1	t_1	r	d	t_1	l_1

2. Write the names (as minor third, etc.) of the following intervals :

(1)	*doh* to *se*.	Augmented 5th.
(2)	*me* to de^1.	Major 6th.
(3)	*ray* to *la*.	Diminished 5th.
(4)	*doh* to *re*.	Augmented 2nd.
(5)	se_1 to *fah*.	Diminished 7th.
(6)	*re* to *soh*.	Diminished 4th.

3. Write the names for the following notes :

(1)	*ray* sharp.	*re*.
(2)	*lah* flat.	*la*.
(3)	*me* flat.	*ma*.
(4)	*fah* sharp.	*fe*.
(5)	*soh* sharp.	*se*.
(6)	*ray* flat.	*ra*.

4. Re-write the following passages on the perfect method. Regard the first note in (1) as *me*, and the first note in (2) as *soh*.

(1) l ta s f d^1 ta s m d^1 r^1 ta l s m f
m f r d s f r t_1 s l f m r t_1 d

(2) r s fe l r d t_1 fe s l fe r m fe s
s d^1 t r^1 s f m t d^1 r^1 t s l t d^1

5. Re-write the following, doubling the value of each note and rest (*i.e.*, write in two pulses what is here given in one pulse) :

| s .s,l : s .,f | m .r : d | .,d : r ., | s .lsf : m .d ||

| s : s .l | s : - .f | m : r | d : - }
| : .d | r : - . | s : l .s .f | m : d ||

6. Fill up two measures of each of the following kinds. Use at least ten notes in each two measures. Begin each measure with a strong accent.

(1) Four-pulse :

| d : r .d | s .,f : m | r : - .s | m : d . ||

(2) Six-pulse :

| d :— : m | m :-.r :d | s :l .s :s .f | m :— :— ||

(3) Three-pulse :

| s :- .m :f .t .l | s .,m :l .s,f :m .d ||

7. Note tests for Division IV. in schools include :

A simple passage containing a transition of one remove indicated by bridge-notes.

Write two passages, one changing to the first sharp key and one changing to the first flat key, of not more than twenty notes each, in accordance with these requirements. Do not write in time :

(1) d m l s $^t d^1$ t l s m^1 r^1 d^1 ^{t}r m f m d r m t_1 d.

(2) d r t_1 d m s ^{t}r m f m r s d ^{t}s f m r m r r d.

8. Time tests for Division IV. in schools include:

One or more series of notes in two-pulse, three-pulse, or four-pulse measure, including pulse-and-a-half notes; also a SIMPLE *phrase in six-pulse measure (beating twice to the measure).*

Write two passages, one in four-pulse measure and one in six-pulse measure, of four measures each, in accordance with these requirements. Use no rests shorter than a whole pulse, and no notes shorter than a half pulse. Write the pulse-signs plainly and boldly, and use '*l*' for the notes throughout.

(1)

l :—	l :l .l	l :	l .l :l .
l :- .	l :l .l	l :—	.l :l

(2)

l :— :—	l :— :—	l :l :l	l :— :—
l :l :l	l :— :l	l :— :—	:— :— :—

9. Transcribe the following passage into two-pulse measure (*i.e.*, write in one pulse what is here in three pulses):

s :— :f	m :f :s	l :t :d'	s :— :—
l :— :—	r :m :f	m :— :—	:— :— :—
s .- .f :m .f .s	l .t .d' :s	l :r .m .f	m :—

10. State the average compass of Trebles (adults), Altos (adults), Tenors, and Basses:

Trebles:—C to G' = d to s' in Key C.
Altos:— G, to C' = s, to d' ,,
Tenors:—Same as Trebles } One octave lower.
Basses:— ,, Altos }

11. Describe the beating of time of (1) two beats in a measure, (2) three beats in a measure, (3) four beats in a measure:

(1) | DOWN *Up* |

(2) | DOWN Right *Up* | or | DOWN Left *Up* |

(3) | DOWN *Left* Right *Up* |

12. State the meanings of the following terms:

(1) A tempo. In (strict) time.
(2) Ad libitum. At pleasure.
(3) Adagio. Very slow.
(4) Dal Segno. Repeat from the sign, 𝄋
(5) Grazioso. In a graceful flowing style.
(6) Calando. Dying away = softer and slower.

Female Candidates.

SECOND YEAR.

Geography.

(*Three hours allowed for this Paper.*)

No candidate is permitted to answer more than SEVEN questions, of which the first question must be one.

1. Draw a map of British America east of the meridian of 100° W. longitude *or* a map of the British possessions in the South of Africa.

(Can be easily answered from any good atlas.)

2. What would probably be the respective occupations of settlers in Natal, Ceylon, and British Columbia?

(*a*) Most of the Natal settlers are engaged in agriculture or ostrich farming.

(*b*) The majority of settlers in Ceylon cultivate coffee, but some, tobacco or cinnamon.

(*c*) In British Columbia the greater portion of the population are engaged in sheep and cattle rearing. The tinned salmon industry is important.

3. 'The structure of the land, together with the latitude, causes the interior of Australia to be one of the most arid regions of the earth.' Explain and illustrate this statement, and compare the climate of Queensland and Victoria.

(*a*) Most of the known mountain ranges are comparatively near the coast, and these, whilst often furnishing a fertile shore belt, yet intercept moisture from the interior. Australia, too, is not penetrated by any deep indentations, and five-sixths of the country is less than 30° from the equator.

Thus, the principal mountain range runs parallel to the east coast under different names, such as the Liverpool Range, the Blue Mountains and the Australian Alps. The only large inlet is the Gulf of Carpentaria in the north, whilst thousands of miles of coast are iron-bound. A line drawn through the middle of Torres Strait is only 10° from the equator, and Brisbane only 28°.

(*b*) Queensland is hot, but on the whole healthy for Europeans. The heat is great in the extreme N., and more excessive along the coast than on the elevated downs in the interior. The mean annual temperature of Brisbane is about 69° and its average rainfall 153 inches.

The climate of Victoria earned for it its original name—Australia Felix. It is very genial, delicious even, to Europeans, and has only the drawback that during the prevalence of the hot northerly winds everything suffers. The mean annual temperature is 58°, and the rainfall 85½ inches.

4. Describe the comparative advantages of a journey to India by the Cape route and the Suez Canal. Why is it advisable to have an alternative route?

The distance between London and Bombay by the Cape route is 11,220 miles, but by the Suez route only 6,332 miles. By the Cape route the equator has to be crossed and recrossed, and great variation of temperature has to be endured, As a rule the Suez route is a less tempestuous one than the Cape route.

The plain reason why it is advisable to have an alternative route is that one of the routes may be for some reason or other impracticable.

Thus, if our passage through the Mediterranean were impeded, or if the canal itself were blocked by hostility or accident, the Cape route still remains. On the other hand, if a crisis arose in India demanding speedy military aid, the canal would of course be utilised.

5. Give a detailed description of the industries, the form of government, and the system of education, in *one* of the provinces of Canada.

Ontario: (*a*) *Government.* The Lieutenant Governor represents the Queen, and there is an Executive and Legislative Assembly, which has exclusive jurisdiction over questions relating to property, civil rights, education, municipal government, and all other matters of local concern, as distinguished from those of a general character, which are under the control of the Federal Dominion Government at Ottawa. The Assembly holds annual sessions and is re-elected every four years under manhood suffrage.

(*b*) *Industries.* The soil of Ontario is of so varied a nature and so fertile that it supports many industries, mostly agricultural, diary-farming, grazing or lumbering.

Agriculture proper is chiefly pursued in the district partially enclosed by Lake Ontario' Niagara River, Lake Erie, Lake Huron, and the Georgian Bay; stock-raising and dairy farming in the neighbourhood of London and Hamilton.; lumbering throughout about 93,000 square miles of territory; mining along the lines of the Ontario Central, Kingston and Pembroke Railways.

(*c*) *Education.* The educational institutions of Ontario are excellent. It posseses Universities, notably that of Toronto, for higher learning, and a Public School system which provides ample means for giving a good common education to everybody. There are also very useful Agricultural Colleges and Farmers' Institutes.

6. From which of our possessions are tea, ginger, petroleum, flax, coffee, ostrich feathers, furs, and rice severally exported?

We get *tea* from Assam, *ginger* from Jamaica and Sierra Leone, *petroleum* from Canada, *flax* from India, Canada, and New Zealand, *ostrich feathers* from Cape Colony and Natal, *furs* from Hudson's Bay Territory and North Canada in general, *rice* from India, Ceylon, Mauritius and West African Settlements.

7. Give a brief account of the growth of our Indian Empire. What portions of India are unhealthy, and why? What steps are taken by Europeans to avoid the intensity of the summer heat?

(*a*) 1611 Factories at Surat, Ahmedabad and Cambay established, 1653 Madras was settled, 1662 Bombay was ceded by Portugal to Charles II., 1698 Fort William (Calcutta) erected on purchased ground, 1757 Battle of Plassey, which secured Bengal, 1771—1785 Benares and the Carnatic secured, 1792 portions of Mysore annexed, 1798 Seringapatam taken and all Mysore incorporated, 1803 Mahrattas' territories added, 1843 Sinde conquered, 1849 Punjaub annexed, 1879 Khyber and Bolan Passes incorporated.

In addition to the above-mentioned, Ceylon, Further India, and Burmah have been secured.

(*b*) The Sunderbunds, the foot of the Himalayas, the jungles and low-lying lands are generally unhealthy. The Sunderbunds constitute the Delta of the Ganges and are frequently misty, and pervaded by malaria. At the foot of the Himalayas there is a dense belt of jungle and rank vegetation caused by the drainage of the range. As in the jungle generally there are many swamps, much decaying vegetation, and miasma. The low-lying grounds are too hot for Europeans.

(*c*) Many Europeans migrate to the hills during the hot season, and the government moves from Calcutta to Simla. Suitable light white clothing is worn, and many mechanical blinds and fans (punkahs) are employed to moderate the glare and the heat. Much of the day's work is done at early morn or late eve, and suitable diets and beverages are instituted.

8. Write what you know about *six* of the following: Grahamstown, Hobart, Churchill River, Lagos, Vindhya Mountains, Christchurch, Quetta, Clutha River, Lahore, Spanish Town, and the Liverpool Range.

(*a*) *Grahamstown* is the capital of the East Province of Cape Colony. Population 7000.

(*b*) *Hobart's Town* is in Tasmania, at the mouth of the Derwent. It is a large port with a fine harbour and is the capital.

(*c*) *Liverpool Range* is in New South Wales, and stretches considerably into the interior, separating the rivers Peel and Macquarie. The principal summits are Vernon and Harrison.

(*d*) *Spanish Town* is an important town in the S.E. of Jamaica.

(*e*) *Lahore* is the capital of the Punjaub. It is on the Ravee, and is connected by railway with Calcutta. Population 150,000.

(*f*) *Christchurch*, on the Avon, is the chief town of the province of Canterbury in New Zealand. Its population is 15,000 and it is the ecclesiastical capital.

9. Describe fully a journey to Hong Kong by the Canadian Pacific route, stating approximately how long each stage of the journey would take.

N.B.—*The following table has been specially furnished by the kindness of Archer Baker, Esq., European Traffic Agent, 7, James Street, Liverpool.*

Stages.	Time taken.	Distance.
From *Liverpool* to *Quebec*	8 to 9 days...	2800 miles.
,, *Quebec* to *Vancouver*	5 to 5½ ,, ...	3052 ,,
,, *Vancouver* to *Yokohama*...	15 to 15½ ,, ...	4600 ,,
,, *Yokohama* to *Hong-Kong*.	5 to 6 ,, ...	1600 ,,
,, *Liverpool* to *Hong-Kong*..	33 to 36 ,,	12,052 ,,

The traveller starting from Liverpool would find a forest of masts in the Mersey, and passing round the north of Ireland would steam across the open ocean until he came near Newfoundland. Here, at the commencement of summer, he might run some danger from icebergs. Sailing up the St. Lawrence he would disembark at Quebec and take train for Vancouver *vid* Montreal, Sudbury, Port Arthur, Winnipeg, Regina and Banff Hot Springs.

During this ride he would see thousands of miles of rolling, undulating wheat ground, immense tracks of forest, and when he neared the 'Rockies' some of the grandest gorges and peaks under the sun. Farmers, lumberers, fishers would all meet his view.

On the W. of the 'Rockies' the railway gradient is very steep, and the line very circuitous, oft-times doubling back on itself.

In British Columbia many Indians are to be met with who offer their wares with a keen idea of their value. Again embarking at Vancouver we bend round the Isle of Vancouver through the straits of San Juan de Fuca, and take a bee-line to Yokohama in Japan.

The strange mixture of east and west would here be very confusing, the engrafting of the English language and English customs being strenuously advocated. If our passenger is lucky, he will see a volcanic eruption and feel an earthquake.

Taking ship again and steering south for Singapore, the traveller meets with the queer-looking Chinese junks, which have not altered in shape for a thousand years. At Singapore itself an enormous trade is being carried on, and people of all nations are to be seen, the Chinese coolie however preponderating.

10. Mention the principal islands belonging to Great Britain in Asia, Africa and America, stating what is the situation of each, what advantage is derived from its possession, and when it was acquired.

Islands.	Situation.	Advantages.	Date of Acquisition.
Asia:—			
Cyprus	In N.E. of Mediterranean	Convenient as naval and military rendezvous	1878
Ceylon	Off S. coast of India	No foreign power can threaten India therefrom	1796
Labuan	Off N.E. coast of Borneo	Coaling station; a kind of secondary warehouse to Singapore	1846
Hong-Kong	Off the mouth of the Canton River	Harbour of refuge; emporium of goods; useful in suppressing piracy	1841
Africa:—			
St. Helena	15° 55′ S. lat. and 5° 42′ W. long. in Atlantic ocean	Watering place for East Indiamen and whaleships' sanitary station	1673
Mauritius, Seychelles, Amirante, Socotra	In Indian ocean 500 m. E. of Madagascar	Preventives of piracy; furnishes us with sugar	1810
	150 m. E. of Cape Guardafui	A link in the Indian Chain; sentry over Gulf of Aden	1876
America, N.:—			
Newfoundland	S.E. of Labrador, at entrance to Gulf of St. Lawrence	Commands finest fishing ground in the world } The same power that holds Canada must hold all these for security	1623
Prince Edward Is.	N. of Nova Scotia		1763
Cape Breton Is.	N.E. of Nova Scotia	Abundance of coal and fish	1758
Bermudas	About 600 m. E. of Cape Hatteras	Dockyards, coaling and military stations	1609
Jamaica	S. of Cuba, in Carribean Sea	Military station; harbour of refuge	1655

11. Describe minutely the river-basin of the Ganges *or* the Murray.

The basin of the Ganges, which is 400,000 square miles in area, is one of the most fertile in the world, with a length of 1,500 miles. The river rises on the southern slope of the Himalaya Mts., at an elevation of 11,000 ft., flows in a course which is generally to the S.E. and empties itself by a large delta into the Bay of Bengal. This delta occupies a great portion of the main basin as far as 200 miles from the sea; its lower part, called the Sunderbunds, is unhealthy, covered by jungle, and infested by wild beasts.

Besides the basin of the Ganges itself, there are the subsidiary basins of its tributaries the Jumna and Sone on the right bank, and the Goomtee, Gogra and Gonduck on the left.

The Jumna itself is about 850 miles long and receives a tributary, the Chumbal, 600 miles long. This vast river basin occupies about four-sevenths of the Great Plain of Hindostan, through which the above-mentioned rivers have cut their valleys.

Almost its whole extent is thickly peopled with a fairly contented, though exceedingly poor, population.

The most important towns are Hurdwur, Furruckabad, Cawnpore, Allahabad, Mirzapore, Benares, Patna, Moorshedabad, Calcutta, with Delhi and Agra on the Jumna, Lucknow on the Goomtee, and Oude on the Gogra.

12. What is the present form of government in West Australia? What change is proposed, and with what limitations as to territory?

The government of Western Australia is carried on by means of a governor, an executive council of five, and a legislative council of twenty-one. Of these latter seven are nominated by the crown, and fourteen are elected for a term of five years.

The colonists desire to bring their form of government into unison with that of the remaining Australian colonies, thus doing away with the nominated members of the Legislative Council.

Whilst the mother country is quite willing to concede this, yet it feels that it cannot allow a population of only 40,000 to grasp 1,000,000 square miles of territory, over which it has no efficient control. At present the occupied portion is only about 600 miles from N. to S. by 150 miles broad.

—o—

Contracted Arithmetic.

BY J. L. RICHARDSON.

SECTION XXXVI.

Greatest Common Measure by Prime Factors.

WHERE several numbers are involved much tedious figuring may be avoided by resolving them into their prime factors, taking the lowest of these common to all the numbers, and multiplying them together for the G.C.M.

Example:—Find G.C.M. of 560, 648 and 824.

$560 = 2 \times 2 \times 2 \times 2 \times 35.$
$648 = 2 \times 2 \times 2 \times 81.$
$824 = 2 \times 2 \times 2 \times 103.$

Factors common to all numbers, $2 \times 2 \times 2 = 8$—G.C.M.

Work in this way the following:—

EXERCISE XXXIX.

Required the G.C.M. of—

1. 352 and 1,304.	2. 945 and 4,675.
3. 636 and 2,566.	4. 840 and 728.
5. 648 and 956.	6. 432 and 976.
7. 549 and 594.	8. 1,142 and 1,256.
9. 732 and 3,560.	10. 488 and 868.

SECTION XXXVII.

Least Common Multiple by Prime Factors.

Resolve each number into its prime factors, and multiply these together, taking each as many times as it oftenest appears in one or other of the numbers.

Example:—Find L.C.M. of 70, 80 and 90.

$70 = 2 \times 5 \times 7.$
$80 = 2 \times 2 \times 2 \times 2 \times 5.$
$90 = 2 \times 5 \times 9.$

The figure 2 appears four times in 80, while 5, 7, and 9 do not appear more than once in any number. In the calculation, therefore, four twos are required, while 5, 7 and 9 will appear only once each.

$\therefore$ L.C.M. $= 2 \times 2 \times 2 \times 2 \times 5 \times 7 \times 9 =$ 5040. Ans.

EXERCISE XL.

1.	Find	L.C.M. of	45, 60 and 90.
2.	,,	,,	5, 20, 16, 9, 28 and 21.
3.	,,	,,	8, 12, 18, 24 and 27.
4.	,,	,,	8, 12, 15 and 20.
5.	,,	,,	11, 12, 15, 16, 24, 30 and 56.
6.	,,	,,	24, 36, 42 and 63.
7.	,,	,,	70, 50, 90 and 105.
8.	,,	,,	8, 14, 16, 25, 40, 25, 40, 50 and 64.
9.	,,	,,	35, 72, 140, 288 and 420.
10.	,,	,,	150, 180, 300, 450 and 900.

SECTION XXXVIII.

Least Common Multiple by G.C.M.

The L.C.M. of two numbers may be found by dividing one of them by the G.C.M. of both, and multiplying the result with the undivided number.

Example:—Required the L.C.M. of 472 and 740.

G.C.M. of 472 and 740 = 4.

L.C.M. $= 472 \div 4 \times 740 =$ 87,320. Ans.

EXERCISE XLI.

Find L.C.M. of—

1. 984 and 792.	2. 540 and 862.
3. 950 and 580.	4. 432 and 694.
5. 351 and 702.	6. 768 and 876.
7. 315 and 505.	8. 784 and 322.
9. 619 and 1857.	10. 402 and 312.

SECTION XXXIX.

Decimal Multiplication.

Multiplication of large numbers in decimals, to a given number of places, may be rapidly effected by reversing the multiplier, and placing it under the multiplicand in such a way that the units digit of the multiplier, in its original form, shall appear directly below the second, third, or fourth decimal of the multiplicand, according to the required number of places. Each line of figures in the working must begin only with that figure of the multiplicand which stands vertically above the multiplying digit, but to the *first* product in each line must be added any

carrying figure accruing from the neglected figures on the right. The line results must not appear as in ordinary multiplication, but must all commence under the units digit of the top line. The number of decimal places will then be marked off in the usual way.

Example :—4·65 × 3·45 to two places.

The multiplier reversed becomes 543. As 3 was the unit figure we place it under the 5, that being the second decimal figure of the multiplicand. In the second line we begin with four times 6, neglecting the 5, but adding its carrying figure, 2, to the product, which thus becomes 26. The 6 we place under the 5 of the first line, and then proceed as usual. For the third line we begin with five fours, adding in 3, which would have been carried from four sixes. The result, 23, we place as before, with the three under the 5 and 6. As the number of decimal places required was two, we mark off so many from the right of the whole product, obtaining the correct answer 16·04.

4·65
5 43
1,395
186
23
16·04

EXERCISE XLII.

Give answers correct to two places.

1. 2·45 × 3·25.	2. 58·4 × 3·18.
3. 615 × 4·55.	4. 3·46 × 27·6.
5. 94·7 × 86·4.	6. 36·5 × 58·5.
7. 59·4 × 9·36.	8. 17·9 × 8·17.
9. 36·2 × 2·63.	10. 7·16 × 21·6.

Give answers correct to three places.

11. 52·34 × 5·36.	12. 351·4 × 2·6.
13. 38·7 × 9·1.	14. 76·81 × 4·53.
15. 92·4 × 58·24.	16. 38·45 × 2·85.
17. 5·604 × 29·31.	18. 580·2 × 80·12.
19. 36·42 × 58·12.	20. 36·4 × 90·1.

ANSWERS.

EXERCISE XXXIX.

1. 8.	2. 5.	3. 2.	4. 56.	5. 4.
6. 16.	7. 9.	8. 2.	9. 4.	10. 4.

EXERCISE XL.

1. 180.	2. 5,040.	3. 216.	4. 120.	5. 18,480.
6. 504.	7. 3,150.	8. 11,200.	9. 10,080.	10. 900.

EXERCISE XLI.

1. 32,472.	2. 232,740.	3. 55,100.	4. 149,904.
5. 702.	6. 16,064.	7. 31,815.	8. 18,032.
	9. 1,857..	10. 20,904.	

EXERCISE XLII.

1. 7·96.	2. 185·71.	3. 2798·25.	4. 95·49.
5. 8182·08.	6. 2135·25.	7. 555·98.	8. 146·24.
9. 95·20.	10. 154·65.	11. 280·542.	12. 913·640.
13. 352·170.	14. 347·949.	15. 5381·376.	16. 109·582.
17. 164·253.	18. 46485·624.	19. 2116·730.	20. 3279·640.

(To be continued.)

THE MIDLAND RAILWAY COMPANY announce that all clerks who intend to enter its service must make themselves acquainted with Pitman's Shorthand, or learn it on entering on their duties. Failing this, they will be disqualified.

How to Teach School Children to Sing from the Staff Notation.

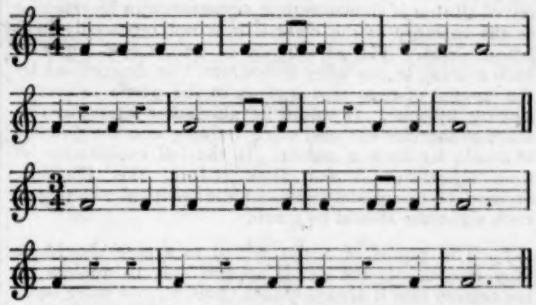
BY W. G. McNAUGHT,

Associate of The Royal Academy of Music.

DIVISION III.—TIME TEST.

CODE REQUIREMENT.

Time Test.—To sing on one sound to the syllable laa *an exercise in* $\frac{4}{4}$ *or* $\frac{3}{4}$ *time, containing semibreves, minims, crotchets, and quavers, with dotted minims, and rests on non-accented portions of the bar.*

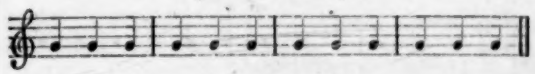
Example :—

71. The additions to the requirements for Division II. are as follows :—

Triple Time.
The Semibreve.
The Quaver.
Dotted Minims.
Crotchet Rests.

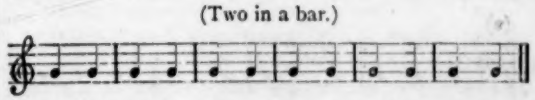
These consist partly of the use of new signs for rhythmic effects already familiar and partly of effects not hitherto needed, at least for the code work.

72. Triple time (*i.e.*, one strong accent in three pulses) is easily felt and performed. Many exercises should be patterned, imitated, and told by ear, before notation is connected. Contrasts between the effects of duple and triple time usefully drive home the speciality of the latter. At first avoid continuations, so that the pulses may be clearly defined. Such questions as 'Do I sing in sets of twos or sets of threes?' and 'How many sets of twos or sets of threes do I sing?' are then easily answered. Individual children should be asked to come forward and tap in sets of twos or threes. Then the blackboard should be prepared, say as follows—

(Three in a bar.)



(Two in a bar.)



and the class questioned as to which line the teacher sings. The function of the bar to show stress should be repeatedly pointed out. A striking way of establishing this connexion is to draw a dozen crotchets on the board and to add the bars before the strongly accented notes as the exercise is performed in duple or triple time.

73. The teaching of the time signature of triple time should be the occasion for a full account of the postulated WHOLE NOTE and the expression of its fractions in a

time signature. The point to be established is that the top figure declares the number of pulses there are to be in each bar and how often a strong accent is to occur, and the bottom figure what fraction of a semibreve or WHOLE NOTE is to stand for the pulse. Further, the whole signature may be regarded as showing what fraction or excess of a semibreve is contained in every whole bar. Thus as—

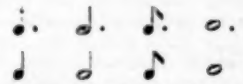
two 𝅗𝅥 are equal to one 𝅝 or WHOLE NOTE

and four ♩ „ „ 𝅝 „ „

the signature $\frac{3}{4}$ means that there are to be three pulses in a bar, and that each pulse is to be represented by one-fourth of a semibreve, viz., a crotchet. Again, the signature also declares that each bar will contain notes or rests to the value of three-fourths of a semibreve.

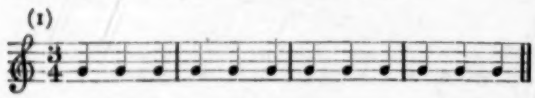
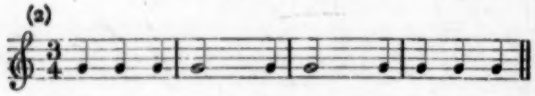
74. It will be too much to expect that this reasoning out of all that is shown in time signatures can be retained in the memory of the class if it is not repeatedly kept before them. The expediency of hammering away at such a point, lesson after lesson, must be determined by the amount of time that is given to the whole subject of singing by note. It would be altogether wrong at this stage to sacrifice ear and voice training and the practice of music for such a matter. If the full explanation of time signatures is not attempted in this Division, incisive dogmatic statements of the practical meaning of each signature should be given.

75. The power of a dot added to a note should be fully taught. If the dot is applied only to minims an impression that it always means 'hold for one more beat' will prevail. The arithmetical relation of the dot to the preceding note is easily appreciated when in the same lesson it is applied to quaver, crotchet, and minim. This recommendation is not meant to extend to the practical exercises given. It will suffice in these to use only dotted crotchets and dotted minims. In enforcing the relation of the dot to the preceding illustrations taken from other known ideas of values should be freely employed. Thus, it may be put to the class if the note stands for a mile—a yard—ten feet—a pint, what will the dot add? Another way of impressing the relation of the dot is to get individuals to write on the board notes corresponding in value to the dots. Thus the teacher writes—



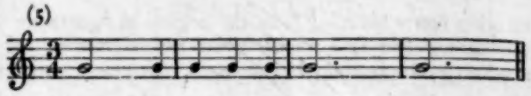
and the pupils add notes under the dots of the first line.

76. The first practical exercises can be most easily given by applying the dot to minims in bars of three-four time. The following exercises are suggested.

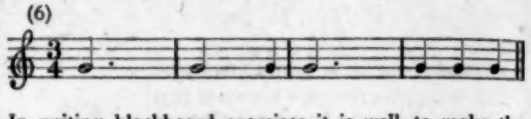
(1)

(2)

(3)

(4)

(5)

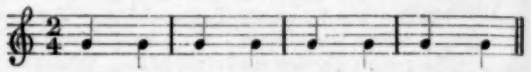


(6)

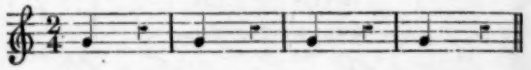


In writing blackboard exercises it is well to make the bars range from line to line as in the above.

77. It will now be convenient to introduce crotchet rests. First, the practical difficulty has to be surmounted and next the sign has to be associated. A good introduction is for teacher and pupils to sing one note each in turn in bars of two-four time, written thus,



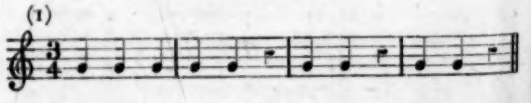
the turning up or down of the stem, picking out clearly the crotchets to be sung by either 'part.' Then the class should sing the upstemmed crotchets and allow the other crotchets to be represented by silent beats. The sign for the rest can now be shown.



The time-names used in tonic sol-fa courses are useful at this stage. Whole pulse notes are, as already explained, called TAA, and whole pulse rests are called *SAA*. To some it may seem undesirable to invite pupils to audibly name 'rests,' when the end sought for is to secure silence. But experience proves that one of the greatest difficulties in teaching rests is to get pupils to pay attention to them—their eyes are so apt to glance from the last note sung to the next note to be sung. Therefore, to form the habit of giving due thought to the rest-sign the time names for rests are really helpful. They must, however, be regarded simply as means to an end, and almost from the first rests should be observed as real rests after the exercises have been fully named. It will be observed that the code requirement asks for rests only on the *weak* accents of the bar. This limitation is a recognition of difficulty, for it is generally much more difficult to observe rests on strong accents than upon weak; more restraint being called for, especially if the tune or exercise has a strongly defined rhythm. When the two-four exercises are easily performed three-four exercises should be introduced with the crotchet rest at the end of the bar.

The following exercises are suggested. It will be observed that they are derived from the three-four exercises given above in section 77. The best form of introduction will be to present the former exercise as originally written, and to alter it bit by bit until it assumes the following form:—

(1)



(2)

(3)

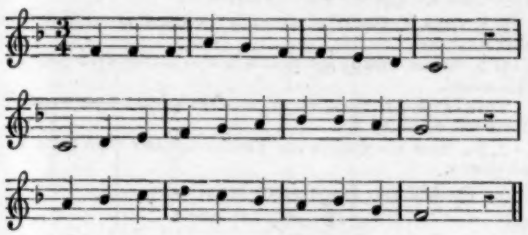
(4)

(5)

(6)

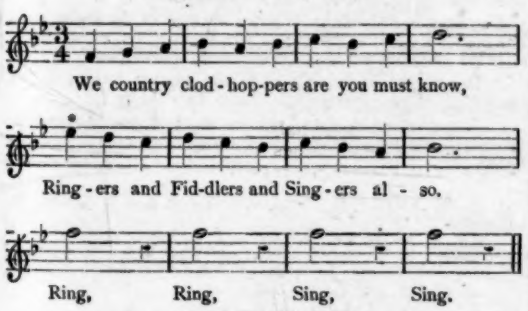
Easy triple time melodies should now be introduced. The tune and round that follow are good specimens of the kind of music at once interesting and useful at this stage.

STAR OF THE SUMMER EVE.



WE COUNTRY CLODHOPPERS.

(*Round in three parts.*)



From *Curwen's* 'Young Voices' (in Tonic Sol-Fa only.)

(To be continued.)

Publications Received.

PRIZE BOOKS.

BLACKIE AND SON.—The Golden Weathercock (*Goddard*).

BURNS AND OATES.—Arctic Voyages of Discovery, Tales of Celebrated Women, Little Snowwhite, Tales of Wonder (*The Granville Popular Library*).

CASSELL AND CO., LTD.—Saturday Journal. Vol. VIII.; The New 'Little Folks'' Painting Book; Little Mother Bunch (*Molesworth*); Bunyan's Pilgrim's Progress and Holy War; Wanted—A King (Illustrated. *Harry Furniss*); Bo-Peep; Little Folks; Little Folks—New and Enlarged Series; Lost in Samoa (*Ellis*).; The Story of the Heavens (*Sir Robert Stawell Ball, LL.D*); London Street Arabs (*Mrs. Stanley*); The Quiver. 1890; The World of Adventure; Celebrities of the Century (*Lloyd Saunders*); The Lion, Magpie, Elephant, Little Folks, Seaside, Scrap Books; Our Scrap Book.

CHAMBERS, W. AND R.—Fred Stamford's Start in Life (*Fairburn*); Beneficent and Useful Lives (*R. Cochrane*); Zoe: The Green Casket (*Mrs. Molesworth*); Their Happiest Christmas (*Edna Lyall*).

HODDER AND STOUGHTON.—Famous Men of Science (*Bolton*).

LONGMANS AND CO.—The Red Fairy book (*Andrew Lang*).

MACMILLAN AND CO.—The Children of the Castle (*Mrs. Molesworth*).

NELSON, T., AND SONS.—Favourite Stories for the Nursery; The Children's Treasury. 1891; Philip: A story of the First Century (*Cutler*); The land where Jesus Christ lived (*Hester Douglas*); The Stories of the Trees (*Dyson*); 'Fritz' of Prussia (*Lucy Taylor*); Alison Walsh (*Constance Evelyn*); Pictures and Stories from English History; The Royal Portrait Gallery.

ROPER AND DROWLEY.—Adventures of Alfan (*Burrow*).

SCOTT, WALTER.—Children of the Poets (*Eric, S. Robinson*); The Natural History of Selborne.

SONNENSCHEIN AND CO.—Life of Joseph Sturge (*Peckover*); Maggie in Mythica (*Doveton*); In the Days of Luther (*Esmé Stuart*).

TOVANI AND CO.—My Edelweiss: Or Trial and Triumph (*Tovani*).

BELL, G., AND SONS.—Elements of Euclid. Books I. and II. (*Deighton*).

BLACKIE AND SON.—Vere Foster's Water Colour Series: Animal Painting for Beginners; The Century Geographical Readers. Nos. 1, 2, 6, and 7; The Century Historical Readers. Nos. 3 and 4; The Scot's Reader; Blackie's Science Text Books: Theoretical Mechanics (*Pinkerton*); Arithmetic of Magnetism and Electricity (*Gunn*); The Century Arithmetics (*Complete*).

BAKER AND SON.—Mental Arithmetic (*Holmes*).

BACON, G. W. AND CO.—New General Atlas of Modern Geography for Schools; The Excelsior Map of Australasia.

CLAY, C. J., AND SONS.—The Smaller Cambridge Bible for Schools: The Acts of the Apostles (*Dr. Rawson Lumby*).

CLIVE, W. B., AND CO.—Text Book of Heat (*Wallace Stewart*); Text Book of Light (*Wallace Stewart*); Analysis of a Simple Salt (*Briggs and Stewart*); History of England, 1685—1801 (*Evans and Fearenside*).

CHURCHILL, J. AND A.—The Dignity of Woman's Health, and the Nemesis of its Neglect (*R. Reid Rentoul*).

CROSBY, LOCKWOOD AND SON.—The Essay Writer (*Skipton*).

CASSELL AND CO., LTD.—Object Lessons from Nature (*Miall*); New German Dictionary (*Eliz. Weir*).

DAWSON, A. G.—The Townley Table Charts.

FISHER UNWIN, T.—The Century Magazine—November and December.

GILL, G., AND SONS.—The Albert Arithmetics. Standards I. to VII.; Gill's Marching Tunes; Gill's Indian Club Exercises.

HOLMES, W. AND R.—Academy Commercial Series: No. 1. Europe.

LAURIE, T.—Common School Education (*Mowry*); Musical Drill (*Warren*).

LONGMANS AND CO.—Handbook of English Literature (*McWilliam*); Explanatory Mensuration (*Hiley*).

MACMILLAN AND CO.—Elementary Classics:—Virgil Aeneid X. (*Owen*); Xenophon's Anabasis IV. (*Stone*); Xenophon's Anabasis for Beginners (*Welch and Duffield*); Elementary Classics: Livy. Book XXII. (*Capes and Melhuish*).

MISCELLANEOUS.—Aston's Check Practice Book.

SMITH, ELDER, AND CO.—The Cornhill Magazine—November and December; The Gamekeeper at Home (*Richard Jefferies*).

JOHNSTON, W. AND A. K.—Johnston's Natural History Charts: Wild Duck, Leopard; Illustrations of Trades: The Hatter; The Printers.

Query Column.

RULES.

1. **Each correspondent is restricted to *one question*.** We should be much obliged if correspondents, who send questions for solution, would give (if possible) the required answer, and the source from which the question is obtained.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. ☞ **When a pseudonym is adopted it should be written at the end of the query, and the real name and address on a separate piece of paper.**

4. Correspondents are requested to write their queries *legibly*, and on one side of the paper only.

5. Replies will not be sent through the post.

6. Queries must reach the office *not later than the 12th of the month*, or they cannot be attended to in the following issue.

*** All communications for this column should be addressed—'*The Query Editor*,' *The Practical Teacher*, *Pilgrim Street, Ludgate Hill, London, E.C.*

Algebra.

1. CATERHAM.—Reduce to their simplest forms :—

(*a*)

$$(a+b+c)^3+(a-b-c)^3+(b-a-c)^3+(c-a-b)^3.$$

(*b*)

$$\frac{x^2-(y-z)^2}{(z+x)^2-y^2}+\frac{y^2-(z-x)^2}{(x+y)^2-z^2}+\frac{z^2-(x-y)^2}{(y+z)^2-x^2}$$

(*Mathematics 2nd Stage, 1890.*)

(*a*)

$$(a+b+c)^3+(a-b-c)^3+(b-a-c)^3+(c-a-b)^3$$
$$=\{a+(b+c)\}^3+\{a-(b+c)\}^3+\{-a+(b-c)\}^3+\{-a-(b-c)\}^3$$
$$=a^3+3a^2(b+c)+3a(b+c)^2+(b+c)^3$$
$$+a^3-3a^2(b+c)+3a(b+c)^2-(b+c)^3$$
$$-a^3+3a^2(b-c)-3a(b-c)^2+(b-c)^3$$
$$-a^3-3a^2(b-c)-3a(b-c)^2-(b-c)^3$$
$$=6a(b+c)^2-6a(b-c)^2$$
$$=6a\{(b+c)^2-(b-c)^2\}$$
$$=6a(b^2+2bc+c^2-b^2+2bc-c^2)$$
$$=6a\times 4bc$$
$$=\underline{24abc}.\ \text{Ans.}$$

(*b*)

$$\frac{x^2-(y-z)^2}{(z+x)-y^2}+\frac{y^2-(z-x)^2}{(x+y)^2-z^2}+\frac{z^2-(x-y)^2}{(y+z)^2-x^2}$$
$$=\frac{(x+y-z)(x-y+z)}{(x+y+z)(x-y+z)}+\frac{(y+z-x)(x+y-z)}{(x+y+z)(x+y-z)}+\frac{(x-y+z)(y+z-x)}{(x+y+z)(y+z-x)}$$
$$=\frac{x+y-z}{x+y+z}+\frac{y+z-x}{x+y+z}+\frac{x-y+z}{x+y+z}$$
$$=\frac{x+y+z}{x+y+z}$$
$$=\underline{1}.\ \text{Ans.}$$

2. F. S.—Show that no three consecutive odd numbers except 1, 3, 5 and 3, 5, 7 can be all primes.

Write down four prime numbers all greater than 150, which only differ in the units' place.

Show that if any number is divisible by 99, the number formed by the same digits in the reverse order is also divisible by 99. (*Men Clerks, Lower Division*, 1890.)

(*a*) Three consecutive odd numbers greater than 7 = an odd number + 2, 4, and 6.

$$2\div 3=2\text{ remainder},$$
$$4\div 3=1\quad,,\quad,$$
$$6\div 3=0\quad,,\quad;$$

If the odd number when divided by 3 gives a remainder of 1, then when 2 is added it will divide exactly.

If it gives a remainder of 2, then when 4 is added it will divide exactly.

If it divides exactly by 3, it will also divide exactly when 6 is added.

Then of three consecutive odd numbers greater than 7 one of them will divide by 3.

∴ No three consecutive odd numbers greater than 7 can be all primes.

(*b*) The following four numbers are primes :—

191, 193, 197, 199.

(*c*) A number is divisible by 9 when sum of digits is divisible by 9.

∴ If a number is divisible by 9, the number formed by the same digits in the reverse order is also divisible by 9.

A number is divisible by 11 when the sum of the digits in the odd places is equal to the sum of the digits in the even places, or if the difference between the two sums is divisible by 11.

∴ If a number is divisible by 11, the number formed by the same digits in the reverse order is also divisible by 11.

∴ If a number is divisible by 9 × 11 or 99, the number formed by the same digits in the reverse order is also divisible by 99.

3. M. MURPHY.— If $a=2$, $b=3$, $c=4$, $d=5$, find the value of—

$$ab+c^2+4(b+d)-4a^2.$$

(*Practical Teacher*, Oct, 1890.)

$$ab+c^2+4(b+d)-4a^2$$
$$=(2\times 3)+4^2+4(3+5)-4.2^2$$
$$=6+16+(4\times 8)-(4\times 4)$$
$$=22+32-16$$
$$=54-16$$
$$=\underline{38}.\ \text{Ans.}$$

4. SODA WATER.—Solve :—

$$2^{2x+3}-57=65(2^x-1).$$

(*Hall and Knight's* 'Higher Algebra.')

$$2^{2x+3}-57=65(2^x-1)$$
$$(2^{2x}\times 2^3)-57=65.2^x-65$$
$$[(2^x)^2\times 8]-65.2^x=57-65=-8$$

Put y for 2^x,

Then $(y^2\times 8)-65y=-8$

$$y^2-\tfrac{65}{8}y=-1$$
$$y^2-\tfrac{65}{8}y+(\tfrac{65}{16})^2=\tfrac{4225}{256}-1$$
$$=\tfrac{3969}{256}$$
$$y-\tfrac{65}{16}=\pm\tfrac{63}{16}$$
$$y=\pm\tfrac{63}{16}+\tfrac{65}{16}$$
$$\therefore y=8\text{ or }\tfrac{1}{8}.$$
$$2^x=8\text{ or }\tfrac{1}{8}$$
$$=2^3\text{ or }\tfrac{1}{2^3}\ (2^{-3})$$
$$\therefore\ \underline{x=\pm 3}.$$

General.

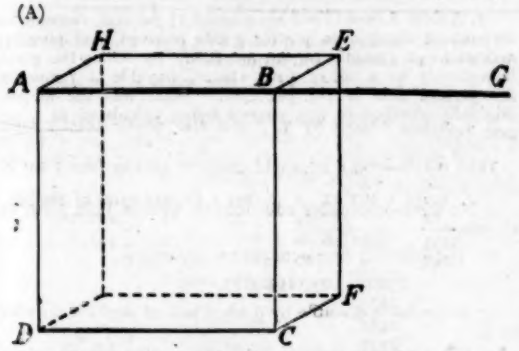
1. ———.—(A) The *moment of inertia* of a uniform rod with respect to an axis passing through one end at right angles to its length, is $\frac{1}{3}$ (mass) × (length)^2; show that when a uniform rod coincides with one edge of a cube, its *moment of inertia* with respect to another edge which neither meets nor is parallel to that edge, is $\frac{2}{3}$ (mass) × (length)^2.

(B) A fine wire of uniform density is bent into the form of the perimeter of a square; find its *moment of inertia* (*a*) about an axis joining the middle points of two opposite sides of the square; (*b*) about an axis passing at right angles to the plane of the square through its middle point; (*c*) about a diagonal of the square. (*Science and Art.*)

(*Prop.*)—If I be the moment of inertia of a body of mass M, about an axis passing through its centre of gravity, and I$'$ the moment of inertia of same body about another axis parallel to the former, and distant k from it, then $I' = I + Mk^2$

(For proof, see *Twisden's Pract. Mechanics*, p. 290.)

(A)



Let AHEFCD represent the cube and AB the uniform rod, and let l be the length, and m the mass, of the rod.

Moment of inertia of AB about axis BE = $\frac{1}{3} ml^2$. Now suppose BG is another rod exactly equal to AB and a continuation of it.

Moment of inertia of BG about axis BE also = $\frac{1}{3} ml^2$;

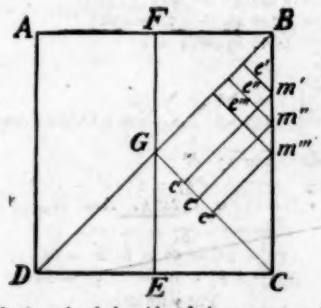
∴ moment of inertia of the whole rod AG about an axis BE (through its centre of gravity B) = $2\left(\frac{1}{3} ml^2\right) = \frac{2}{3} ml^2$.

If I$'$ be the moment of inertia of the rod AG about axis CF (neither parallel to nor meeting AB), then, from the above proposition

$$I' = \tfrac{2}{3} ml^2 + 2ml^2 = \tfrac{8}{3} ml^2,$$

and since AB = $\frac{1}{2}$ AG, the moment of inertia of AB about axis CF = $\frac{I'}{2} = \frac{4}{3} ml^2$. Q. E. D.

(B)



Let l be the length of the side of the square and m the mass of the wire constituting one side.

(*a*) *To find the moment of inertia about EF:*

Moments of inertia of AF, FB, CE, ED about the axis EF each = $\frac{1}{3} \frac{m}{2} \times \left(\frac{l}{2}\right)^2 = \frac{1}{24} ml^2$;

∴ moment of inertia of AB together with DC = $\frac{1}{8} ml^2$ (1),

and ,, ,, BC and AD each = $m\left(\frac{l}{2}\right)^2 = \frac{1}{4} ml^2$;

∴ ,, ,, BC and AD together = $\frac{1}{2} ml^2$ (2)

∴ ,, ,, of whole square ABCD = (1) + (2) = $\frac{5}{8} ml^2$.

(*b*) *To find moment of inertia about an axis through* G ⌊ r to *the plane of paper:*

Moment of inertia of each side about an axis through its centre of gravity = $\frac{1}{12} ml^2$;

∴ ,, ,, of each side about an axis through G

$$= \tfrac{1}{12} ml^2 + m\left(\frac{l}{2}\right)^2. \text{ (See Prop.)}$$

$$= \tfrac{1}{3} ml^2;$$

∴ ,, ,, of whole square about axis through G = $\frac{4}{3} ml^2$.

(*c*) *To find moment of inertia about a diagonal DB:*

It is quite evident from symmetry that the moment of inertia of each side will be the same. Suppose one of the sides (BC say) is divided into an indefinite number of equal particles, whose masses are each m', and whose perpendicular distances from DB are l', l'', l''', &c.

Then, moment of inertia about DB

$$= (m'l'^2 + m'l''^2 + m'l'''^2 + \&c.)$$

$$= \text{total mass of side } (m) \times (l' + l'^2 + l''^2 + \&c.)$$

Since these lengths l' &c., vary between zero and the length of GC, it is evident that the moment of inertia of BC about DB is the same as that of GC, so far as the length element is concerned, but the mass involved being that of BC instead of that of GC.

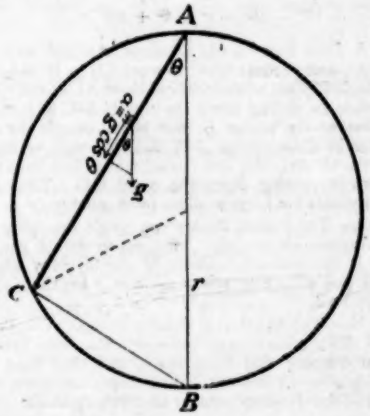
∴ moment of inertia of BC about DB = $\frac{1}{3} m$ (GC)^2

$$= \tfrac{1}{3} m\left(\frac{l}{\sqrt{2}}\right)^2 = \tfrac{1}{6} ml^2;$$

∴ moment of inertia of the whole square about DB = $\frac{1}{2} ml^2$.

2. C. G.—(*a*) If a chord drawn through the highest point of a vertical circle be regarded as a smooth inclined plane, find the time that a particle would take in sliding down that chord.

(*b*) A point and a straight line are in the same vertical plane; of all straight lines drawn from the point to the given straight line, find that down which a smooth particle would descend in the shortest time.



Let ABC be a vertical circle of radius r, and AC a chord whose inclination to the vertical AB is θ. Then, since the triangle ABC is inscribed in a semicircle and AB is a diameter, the angle ACB is a right angle.

$$\therefore AC = AB \cos\theta = 2r \cos\theta$$

Acceleration down the plane = $g \cos\theta = a$ say, and since in uniformly accelerated motion $s = \frac{1}{2} at^2$, we have

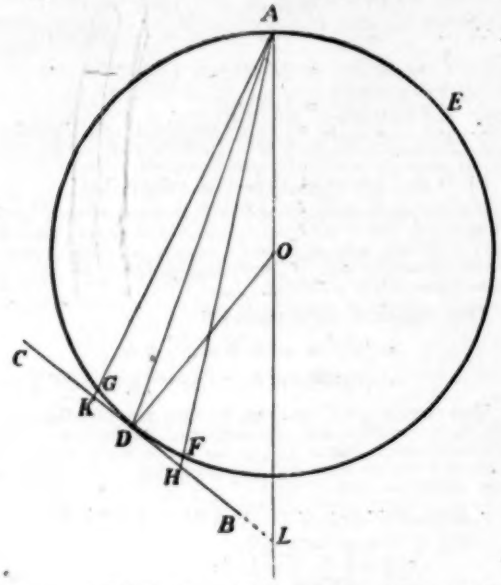
$$2r \cos\theta = \tfrac{1}{2} g \cos\theta\, t^2$$

$$\therefore 4\frac{r}{g} = t^2$$

$$\therefore t = 2\sqrt{\frac{r}{g}}$$

As this expression for t is independent of θ (the inclination of the chord), it follows that the time taken by a particle in sliding down all chords drawn through the point A is the same.

(*b*)



Suppose BC is the line, and A the point in the same vertical plane. Draw a vertical line AL through A. From a centre in AL draw a circle ADE passing through A and touching BC in some point D. Join DA. This will be the required line.

Since BC touches the circle at D, $\angle ODL = 90°$

$$\therefore \angle DOL = (90° - \angle OLD)$$

But $\angle DOL = \angle OAD + \angle ODA = 2\angle OAD$ (since OA = OD)

$$\therefore \angle OAD = \tfrac{1}{2}\angle DOL = \tfrac{1}{2}(90° - \angle OLD)$$

But $\angle OLD$ is known, being the inclination of BC to the vertical. If, therefore, an angle OAD be set off from the vertical line AL at A, equal to half the complement of angle OLD, AD will be the required line.

Proof.

From A draw any chords *whatever* AF and AG, on either side of AD, and produce them to meet CB in H and K. Since A is the highest point of the vertical circle ADE, the times taken by a particle in sliding down the chords AG, AD, and AF are equal. But as the points K and H fall outside the circle, the times taken in sliding down AH and AK will be longer than those down AF and AG, and consequently also longer than the time taken in passing down the chord AD. Thus AD is the line down which the particle slides most quickly.

3. BOB.—The French Books you name are quite suffiicent for the examination in July, 1891. You should get the Code and read it for yourself. There is one in every school. We cannot tell you what are failing subjects. Do them all at least moderately well.

4. E. N.—The Syllabus is definite enough. You should read that first. You cannot take Science. You had better go on with your History and Geography, and then read the New Syllabus as soon as it is out. The important parts of it were published in the January number of this magazine.

5. RALPHO:

'Fortunam præstare nemo potest: satius est meruisse.'

or

'Nullius arbitrio paret Fortuna: benignam
Fortibus hæc melior sors meruisse manet.'

Arithmetic.

1. ANXIOUS.—A company is formed in which the liability of each partner is limited to the amount of his shares. There are 500 shares of £10 each; after 3 calls have been made of £2 on a share, it is found that the concern is a failure, and its affairs are wound up. At this period, its assets are £10,217 0s. $0\frac{3}{4}$d., and its liabilities £15,763 17s. 6d. How much will the company be able to pay in the pound after all the remaining calls are paid up? (*Barnard Smith.*)

Total amount available for dividend

$$= £10{,}217\text{ 0s. }0\tfrac{3}{4}\text{d.} + (500 \times 4)£.$$
$$= £12{,}217\text{ 0s. }0\tfrac{3}{4}\text{d.}$$

£ £ £ s. d.
$\therefore$ 15,763¾ : 1 :: 12,217 0 0¾ : Payment in the £.
8 8

126111 97736 0 6
20
1954720(15s.
126111
693610
630555
63055
12
756666(6d.
756666

= 15s. 6d. Ans.

2. ANNIE LINDSAY.—I am allowed 1¼ per cent. discount on an amount charged to me for goods received, and give my acceptance at 5 months for the net sum. By selling the goods immediately for a bill of £162 12s. 2d. payable at 7 months, my present gain is 11⅛ per cent. What was the amount originally charged to me, interest being calculated at 5 per cent.?

$\frac{1}{12}$ of £5 = £2½;

£ £ s. d. £
$\therefore$ 102½ : 162 12 2 :: 100 : Present value of the bill.
12 12 20
1235 1951 6 0
247 20
)39026 0 0(158£
247
1432
1235
1976
1976

£ £ £
$\therefore$ 111⅑ : 158 :: 100 : Present value of the acceptance.
9 9
1000 1422

= £142 4s.

$\therefore$ Amount of the acceptance

= £142 4s. + interest on £142 4s.
= £142 4s. + $\frac{5}{12}$ of 5% on £142 4s.
= £142 4s. + $\frac{5}{12} \times \frac{1}{20}$ of £142 4s.
4
= £142 4s. + $\frac{1}{48}$ of £142 4s.
= £142 4s. + £2 19s. 3d.
= £145 3s. 3d.

£ £ s. d. £
100
1¼ : 145 3 3 :: 100 : Original amount.
98¾ 4 20
4 580 13 0
395 20
79)11613 0 0(147£. Ans.
79
371
316
553
553

3. LILIAN.—A tea merchant mixes his tea and puts 2 lbs. of green to every 5 lbs. of black. How many lbs. of green would there be in 4 cwt. 7 lbs. of the mixture?

Green tea = $\frac{2}{2+5}$ of the mixture;

= $\frac{2}{7}$ of the mixture.

$\therefore$ Quantity of green tea = $\frac{2}{7}$ of 4 cwt. 7 lbs.
= $\frac{1}{7}$ of 8 cwt. 14 lbs.
= 1 cwt. 18 lbs. Ans.

4. ANXIOUS ONE.—What sum must I have invested in the Three per cents. standing at 90⅜, if a transfer of ¼ of my capital to the Four per cents. at 115 would increase my income by £7?

(*McDougall's* 'Public School Arithmetic for St. 7.')

Income on £1 in 1st stock = $\frac{3}{90\frac{3}{8}}$ £

$= \frac{24}{723}$ £;

" 2nd " = $1\frac{1}{15}$ £;

Difference of income on £1 = $(1\frac{1}{15} - \frac{24}{723})$ £

$= \frac{580 - 552}{16675}$ £

$= \frac{28}{16675}$ £;

$\therefore \frac{£}{\frac{28}{16675}} : \frac{£}{7} :: \frac{£}{1}$: Amount of capital transferred.

$= \frac{7 \times 16675}{28}$ £

$= £\frac{116725}{4}$;

$\therefore$ Sum invested = $(\frac{116725}{4} \times \frac{4}{3})$ £

$= \frac{116725}{3}$ £

$= £6,947$ 18s. 4d. Ans.

5. JOSEPHUS.—In 1878 the number of deaths in a certain kingdom was 391369; the decrease per cent. is 8·18103 from the preceding year; what was the number of deaths in 1877?

(*Blackie's* '7th Standard Arithmetic.')

100
8·18103
91·81897 : 391,369 :: 100 : No. in 1877.

= 91·81897)39136900(426,239
36727588
24093120
18363794
57293260
55091382
22018780
18363794
36549860
27545691
90041690
82636873
7404817

$\therefore$ Number of deaths in 1877 = 426,240. Ans.

6. FOLKESTONIAN.—A starts from London to meet B, who starts from Cambridge at the same time. They meet 25 miles from London, the distance between London and Cambridge being 55 miles. If each had walked at the rate of 4 miles an hour, they would have been 12½ minutes longer before they met. Find the rate at which each walked.

(*Cambridge Local, 1889.*)

Time of meeting in 2nd case = $\frac{25}{4}$ hours

$= 6\frac{1}{4}$ hrs.;

" " 1st case = $6\frac{1}{4}$ hrs. − 12½ min.

= 6 hrs. 52½ min. − 12½ min.

= 6 hrs. 40 min.

= $6\frac{2}{3}$ hrs.;

$\therefore$ A's rate per hour = 25 miles ÷ $6\frac{2}{3}$

$= \left(\frac{25}{1} \times \frac{3}{20}\right)$ miles

$= 3\frac{3}{4}$ miles.

B's rate per hour = (55 − 25) miles ÷ $6\frac{2}{3}$

$= (\frac{30}{1} \times \frac{3}{20})$ miles

= 4½ miles.

Geometry.

1. XMAS.—If a straight line drawn through the centre of a circle cut a straight line in it which does not pass through the centre at right angles, it shall bisect it. Lines drawn at right angles to the sides of any figure inscribed in a circle from their middle points meet in one point.

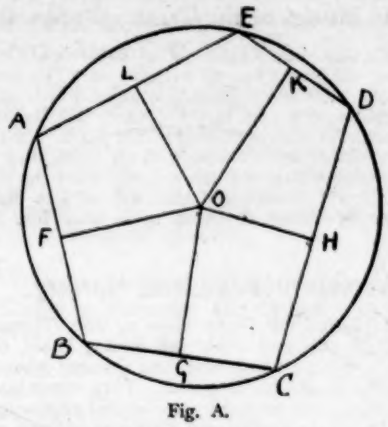


Fig. A.

Let the figure ABCDE be inscribed in a circle.

Draw FO, GO at right angles to AB, BC from their middle points.

Then O is the centre of the circle. (III. 1. Cor.) Draw OH, OK, OL at right angles to CD, DE, EA.

Then OH, OK, OL trisect the sides CD, DE, EA. (III. 3.)

Wherefore the lines drawn at right angles to the sides from their middle points meet in one point, viz., the centre of the circle. Q.E.D.

Publications Reviewed.

PRIZE BOOKS.

Messrs. T. Nelson and Son's List.

Speaking generally of Messrs Nelson's list of Prize books for the present season we may say that they are eminently suitable as gifts, and that they are distinguished by the beauty of binding, type, and illustrations, which have marked their productions in former years. Their list includes—

(1) Pictures and Stories from English History.

(2) The Royal Picture Gallery.

These are two companion quarto volumes. The latter contains a short account of all the principal sovereigns of England, and is embellished with good portraits of the various royal personages, and with other pictures with which persons acquainted with the Royal School Series are quite familiar, but which will all bear reproduction in this form.

The title well describes the contents of the first volume. Both books are very suitable for placing in the hands of young children, and those of a larger growth will look at the pictures and read the stories with pleasure and profit.

(3) The Land where Jesus Christ lived. By Hester Douglas.

The land of Canaan will never lose its fascination. Children seldom tire of Bible stories. In familiar chats with her nephew Aunt Hetty describes the physical characteristics of the Holy Land, and gives again the narratives of the well-known events connected with each. She does not neglect to convey the moral and other lessons the scenes and events suggest. The language is simple and natural without being goody-goody. The book will be read with pleasure.

(4) The Stories of the Trees. By Mrs. Dyson.

Those who have read Mrs. Dyson's 'Children's Flowers' will give a hearty welcome to 'The Stories of the Trees.' She chats pleasantly about all our principal forest trees, and a walk in the country will be infinitely more delightful after a perusal of her book. Instruction and amusement are blended with an inculcation of the love of nature throughout the volume, while the sketches of leaves, buds, flowers, and fruit, will help to dispel the ignorance of many of those even who live in the country.

(5) Favourite Stories for the Nursery.

Ali Baba and the Forty Thieves, Tom Thumb, The Sleeping Beauty, and Little Red Riding Hood, come to us in this volume along with half-a-dozen other of the old familiar stories of our youth. They never lose their interest, and accompanied by the capital engravings with which the book is filled are likely to become greater favourites than ever.

(6) The Children's Treasury of Pictures and Stories. 1891.

Full of anecdotes, short stories, natural history lessons, poetry, and moral truths pleasantly conveyed.

(7) Fritz of Prussia, Germany's Second Emperor. By Lucy Taylor.

English people will always feel a deep interest in 'Unser Fritz.' Intimately connected as he was by marriage with our own royal family, his career was followed with more than ordinary interest by the people of this country. The story of his life is here well told. Beginning with a sketch of Prussia in the olden time, the authoress pleasantly traces its growth into the present German Empire, the wars with Austria and France, in which Fritz took such a prominent part, taking up an important place in the volume. And after victory had been won, Germany united, and the prospects of a long, liberalizing, useful reign seemed bright and glorious, came the shadow of death and the anxious years which ended a brief but promising reign. The authoress carefully avoids controversial subjects, and has written a pleasant and useful volume.

(8) Philip: A Story of the First Century. By Mary C. Cutler.

The events connected with the birth, life, and death of Christ are here woven into a story in which Philip, a youth at the time of Christ's birth, and afterwards one of Christ's disciples, takes a prominent part. The narrative will prove interesting to young people, as the language is well chosen, the scenes are carefully and graphically pourtrayed, and a spirit of reverence is properly diffused throughout the book.

(9) Alison Walsh: A Story of To-day. By Constance Evelyn.

This is one of a class of stories with which we are becoming very familiar. A young girl begins to entertain doubts about the reality of religion because of the inconsistencies of its professors, goes through a varied experience, and ultimately finds the peace of mind for which she sought. The characters in the story are all well drawn, but the most interesting is that of the heroine herself. Her influence is nearly always for good, and in helping others she is herself helped into the light. It is a story for grown-up people, and is highly interesting from first to last.

Messrs. Chambers' List.

(1) Beneficent and Useful Lives. By Robert Cochrane.

A timely and worthy companion volume to the 'Good and Great Women' we noticed twelve months ago. These are short lives of Earl Shaftesbury, George Peabody, Sir Josiah Mason, Andrew Carnegie, Samuel Morley, and a number of other great benefactors of the human race. They are well written and cannot but prove helpful and inspiring to the youths for whom they are intended.

(2) Their Happiest Christmas. By Edna Lyall.

This gifted authoress is as much at home and writes with as facile a pen this capital story for children as she writes for older people. Jack and Joan are brother and sister, whose Christmas seems likely to be spoiled through the illness of their mother; but just at the right time home comes Cousin Paul, who teaches them that in helping others and trying to make them happy true happiness for themselves may be found. It is a charming little story.

(3) Zoe. By the author of 'Laddie,' 'Tip Cat,' &c.

This is a short story for older people. An only child has left her father's roof for the man of her choice, who turns out to be a worthless fellow. The ailing and repentant daughter asks her father's help for her child's sake, but is spurned as an outcast. Her words, however, have sunk into his heart, and when a child is found on his doorstep he instinctively guesses it to be his own grandchild, and although he contrives that it shall be found by a labourer, he watches over it in a most unusual fashion. Better feelings come into his heart through the foundling Zoe, who turns out to be the child of a gipsy; and these lead to his reconciliation with his daughter, and her restoration to his home and heart.

(4) Fred Stamford's Start in Life. By Mrs. Fairbairn.

A story full of pathos describing the kindness of two street arabs to the hero, who has been left an orphan at an early age. Calculated to infuse kindly feelings, and to promote unselfishness in the breast of every boy who reads it.

(5) The Green Casket and other Stories. By Mrs. Molesworth.

Three short stories which will be read with pleasure by both boys and girls. The first tells about the temptation to hide a fault committed by a girl going out to her first place, and the evil consequences which followed. 'Leo's Post Office' introduces a mysterious disappearance which will stimulate the curiosity of the reader; and 'Brave little Denis' shows how natural fears may be overcome by the youngest through a desire to do a kindly action.

Messrs. Cassell and Co.'s List.

(1) Bo-Peep: A Treasury for the Little Ones.

'A Treasury' indeed of stories and pictures, and one that the very little ones can understand. The daintily coloured 'Bo-Peep' on the cover, accompanied by her sheep, adds no small charm to the book. Rhymes, pictures, stories, and the exceptionally large clear type, are all that could be desired. Bright eyes will grow still brighter when they glance through the pages of beautiful 'Bo-Peep.'

(2) **Little Folks.** Two Vols. 1890.

Amongst all the children's books of 1890 'Little Folks' still holds its own as a prime favourite. Full of capital stories, beautiful pictures, pretty verses and music, it well deserves the enviable position it has attained. The attractive binding will give unbounded delight to its youthful owners.

(3) **Bunyan's Pilgrim's Progress and Holy War.**

This handsomely-bound volume of the immortal dreamer with its splendid illustrations, bold type, and valuable notes, will prove a great acquisition to all home and school libraries.

It is a pleasure to turn over the pages of this superbly printed book.

Far and away the best edition we have ever seen for popular use.

(4) **Lost in Samoa: A Tale of Adventure in the Navigator Islands.** By E. S. Ellis.

Twenty years before the incidents of this story are supposed to have happened, a vessel was wrecked close to shore, off the South Sea Islands. The wreck sank, burying with it a small box full of precious stones. Only two living persons knew of the existence of this treasure, and only one the exact locality of the wreck, he being a convict, living on one of the islands. A young American—a son of the possessor of the secret—undertakes to gain from the convict a document containing particulars of the wreck, and thus, if possible, recovering the gems.

This undertaking brings him some very trying experiences, and imperils his life. He acts, however, as none but a brave boy could, and at last his enterprise is successful, and the much coveted treasure rescued from the sea. The descriptions of the island's scenery and natives are graphic and entertaining, whilst the pictures by Gordon Browne are just to a lad's taste.

(5) **The World of Adventure.**

Each volume of this handsome book is complete in itself, and contains thrilling stories of adventure. Truly fact is stranger than fiction. The hairbreadth escapes told in graphic language are enough to make one's hair stand on end. The book, like its predecessor of a year ago, is beautifully got up and profusely illustrated in the best style. Pre-eminently a book after a boy's own heart.

(6) **The Lion Scrap Book.**

(7) **The Little Folks' Scrap Book.**

(8) **The Elephant Scrap Book.**

(9) **The Magpie Scrap Book.**

(10) **The Seaside Scrap Book.**

(11) **Our Scrap Book.**

All these tastefully bound scrap books are ready filled with Messrs. Cassell and Co.'s delightful pictures. A regular gallery of charming sights. The excellence of Messrs. Cassell's engravings is too well known to need comment, but the novelty of a book filled with them should attract all picture lovers, young and old. To carefully look through one of these scrap books is an education.

(12) **London Street Arabs.** By Mrs. H. M. Stanley (Dorothy Tennant).

An album of exquisite sketches, mainly of children from the streets of London. The 'word' picture of how the work was accomplished, 'given by way of introduction' to the volume, is as graceful and natural as the pictures themselves. The young people who are fortunate enough to gain this elegant and, in the best sense, artistic volume, will have a prize for a lifetime. We give it our warmest praise.

(13) **Wanted—A King: or, How Merle set the Nursery Rhymes to rights.** By Maggie Browne.

This enchanting tale for children tells how Merle drops asleep, is taken under the protection of Mr. Sopleaf, and carried by Mr. E. Wind into a strange country. In her travels she visits the original 'old woman in her shoe,' 'Jack in his box,' and a host of other long-loved Nursery celebrities. The story of how she finds all the troubles of Nursery land caused by the want of a king is charmingly told. The child must indeed be a dull one who cannot learn a lesson of cheerfulness and contentment from this delightful story book. 'Grunter Grim' is painted ugly enough to make the little folks determine to banish him. The pictures, by Harry Furniss, are Nursery lore personified. In its unique and beautiful dress 'Wanted a King' is a model prize book.

(14) **Little Mother Bunch.** By Mrs. Molesworth.

'Little Mother Bunch' is just the book to give a girl. The narrative shows how easily a girl may be mistaken in choosing a friend. Quiet self-possession is often mistaken for conceit, and bright winning ways for true affection. The lessons taught by the story will fit into every-day life, and cannot fail to be useful to all who will take them to heart. The get-up of the book is chaste and striking.

(15) **The New 'Little Folks' Painting Book.**

As an incentive to the little lovers of painting this new book, when coloured, can be entered to compete for a prize, under conditions given in the preface. Apart from all this, the pages, filled with lovely outline pictures, will be indeed a boon to all mothers and teachers, who know how difficult it is to supply the youngsters with 'something to paint.' Delightfully the long winter days can be passed with this shilling book and an ordinary box of water colours at hand. The training of eye and hand must also prove invaluable to a child, who, although playing, will still be learning.

(16) **Cassell's Saturday Journal.**

A storehouse of reading for the family. Full of tales, detective stories, smart bits, and plenty of pictures. In the home where this volume has a place there will always be not only something to read, but something worth reading.

(17) **The Quiver—1890.**

A volume of the 'New and Enlarged Series' of this excellent magazine cannot fail to be welcome. The stories, by first class authors, are pure and good, whilst the Bible lessons and short sermons will prove invaluable to many. The book contains over 950 pages of interesting and instructive matter, plentifully embellished with good illustrations. The binding happily combines elegance with durability. Just the book to give for Sunday reading.

(18) **The Story of the Heavens.** By Sir Robert Stawell Ball, L.L.D.

For a pupil teacher or elder scholar, who is fond of science, we know of no more suitable present than this popular work on astronomy. It cannot fail to develop a taste for this enthralling branch of science. To the ordinary reader it will, indeed, prove a veritable journey through wonderland. The plates are exquisite, and the whole book deserves our highest commendation. We have not seen a handsomer or more instructive presentation volume this season.

(19) **Celebrities of the Century: A Dictionary of Men and Women of the Nineteenth Century.** By Lloyd C. Sanders.

In these days, when every one is expected to know something of everybody, a book of this kind becomes a necessity, and should always be near at hand as is the ordinary dictionary. Clear, concise, reliable and moderate in price, the book needs no further recommendation, and we strongly urge our readers to get a copy. An ideal volume for a school library or a teacher's book-shelf.

Messrs. Roper and Drowley's List.

(1) **The Adventures of Alfan: or, The Magic Amulet.** By the late John Holme Burrows, B.A.

Alfan is a young Egyptian, living in Cairo. 'The Magic Amulet' was given to him by a wizard of his country, and is to be to him a sort of second conscience, for if he will take the trouble to consult it about any important step in life, it will always advise him wisely. Like many another lad, Alfan gets restless and discontented with home life and surroundings, and thirsts for riches and distinction. Thinking his own wisdom superior to that of his adviser, he runs away from home and duty. Plenty of adventures befall him; but although in one eastern country he is elected and made king, he finds no settled happiness, and, finally, is so thoroughly disgusted with the toadyism to money and power, that he relinquishes all his riches to return to the true and loving hearts at home.

The story is told in a bright attractive style, with eight capital pictures by J. D. Watson, and is presented in a handsome binding. An excellent prize book for either boy or girl.

Shakespeare's Cymbeline. Edited, with Notes, by C. M. Ingleby, L.L.D. Revised by Holcombe Ingleby, M.A. London: Trubner and Co.

This edition of Cymbeline, a play less often used in schools than many others, less suitable perhaps than most to introduce young students to the works of Shakespeare, is, according to the title-page, 'Adapted for the Use of Schools.' The editors have accomplished their task with much care. By a well-contrived method of abbreviation they give the various readings of the most important early copies of the play with the conjectures of different editors and emendators. The notes are separated from the 'various readings,' though both are printed at the foot of successive pages of the text. They consist of clear, and for the most part reasonable, explanations and criticisms, rather than mere verbal and grammatical annotations. The book gives one the idea of being rather a scholarly edition than a simple help to beginners in Shakespearian study; but we believe it will be found to afford useful aid to any student who reads it with the attention which a drama like Cymbeline demands from those who would study it profitably.

The Myths and Legends of Ancient Greece and Rome. By E. M. Berens. London: Blackie & Son, Limited.

In this book, the author places before the reader the stories of Greek and Roman Mythology, in a manner that cannot fail to attract attention. Instead of the alphabetic arrangement of the classical dictionaries, the plan is adopted of giving the information in the far more interesting form of a tolerably continuous narrative. By this means, the meaning of the myths, their progressive development, and the connection to be found between those of Greece and those of Rome are clearly shown. At the same time, the index, which gives the pronunciation of the proper names, makes the book readily serviceable for purposes of reference. In the latter part of the book, Mr. Berens narrates the legends which form the subjects of the Greek poets and dramatists, such as the story of the Argonauts, the Labours of Hercules, the Seven against Thebes, Theseus, the Siege of Troy, and the Return of the Greeks. The volume should prove very useful especially to young readers, whose requirements appear to have been carefully kept in view. It is desirable that a due appreciation of the poetry contained in the ancient myths should be inculcated in the minds of students, and the author of this book seeks to do this in a spirit of reverence and sympathy. We should add that suitable woodcuts, remarkably well executed, illustrate the text which is very nicely printed.

Outlines of the World's History, Ancient, Mediæval and Modern. By Edgar Sanderson, M.A., in Four Parts. London: Blackie & Son.

This admirably written compendium of the History of the World is now, by its re-issue in separate volumes, made available for more extensive use. The first part deals briefly but clearly with the history of China, India, and the ancient oriental monarchies; the second tells, with fuller detail, the story of ancient Greece and Rome; the third gives a rapid sketch of Mediæval history; and the fourth takes up the story of the nations of the modern world. Noteworthy features of this work are the broad spirit which pervades the writer's views of the relations and bearing of historical events; the good judgment with which the less important and more obscure parts of the history are condensed and treated generally, while the greater events are dwelt on more fully and more impressively; the pleasing attractive style, rising on occasion to positive brilliance; the copious chronological tables and synopses of periods of history; the abundance and suitable character of the illustrations, and the excellence of the historical maps inserted. We know of no work of similar size which we can so heartily recommend as an introduction to general history as the one before us.

Elementary Text Book of Trigonomeiry. By R. H. Pinkerton, B.A. London: Blackie and Son.

This little volume has reached a second edition, thus proving itself to have received the commendation of practical teachers. To those who have not yet seen or used the book we would say that it is excellent in arrangement, clear in its definitions and expositions, illustrated in all its chapters by numerous examples, and with the addition of all the questions given during the last ten years in the Science and Art Examinations (2nd stage), and the Intermediate Arts Examination of the London University, it provides all that is needed for theory and practice for those who are preparing for the examination named. The book is clearly printed, well bound, and has answers and logarithmic tables for all the questions given.

Burke's Reflections on the Revolution in France. Edited with introduction and notes. By F. G. Selby, M.A. London: Macmillan and Co.

This is one of Macmillan's series of English Classics specially prepared for Indian students, but equally well-adapted for the use of students at home. In thoroughness and careful treatment the present volume appears to fall no whit behind its predecessors. The introduction is an admirably written essay on the causes and agents of the French Revolution. With Burke's eloquent attack on the principles and actions of the Revolutionists, Mr. Selby deals frankly and with careful discrimination. He points out how Burke, in his hatred of anarchy, fails to recognise and allow due weight to the influences which had made revolution inevitable; and however deplorable the excesses of the populace might be, blame must fall heavily on the system which provoked the revolution.

The text is extremely well printed, with numbered lines; the notes are very clear, and as full as can be desired; and the volume is bound in the neat and serviceable style which distinguishes the series.

The student who wishes to make the acquaintance of Burke's eloquent essay in political philosophy will have a treat in doing so under the able guidance afforded by Mr. Selby's edition.

Elementary Algebra. By Charles Smith, M.A. London: Macmillan & Co.

So many alterations have been made in the second edition of this book that it may be regarded as a new work. Those who have during the past four years used it know its suitability as a text-book in schools. There is no doubt that the alterations and additions will render it still more useful. Its statements are precise and clear, and its examples, largely increased in number, are sufficient in quantity and varied in quality. The new chapters on logarithms and scales of notation add to its value, and the answers may be, we believe, implicitly relied upon as correct. The book now extends to nearly 400 pages and contains all that is necessary or desirable in an elementary work on algebra. It is got up with all the neatness and superiority of paper, printing and binding which characterise the productions of the publishers. We can confidently recommend it for use in higher elementary and middle class schools.

Bacon's Essays. Edited, with Introduction and Notes, by F. G. Selby, M.A. London: Macmillan and Co.

This is a volume of the very satisfactory series of English Classics which the publishers have issued mainly for the use of Indian students. They will be found, however, thoroughly well adapted for the guidance of English students generally. Here and there may be found explanations which should be needless to most students at home, as in the following note to the essay on 'Revenge:'—'*Job*, a person whose history is given in the Bible. He was distinguished by his patience and piety under misfortune;' and in a similar explanation of an allusion to Lazarus in the essay on 'Goodness.' Such slight redundancies do not constitute a drawback to the value of the book, as most of the notes are of the most desirable kind.

The introduction is a weighty and well-written essay on the characteristics of the sixteenth century, and the relations of Lord Bacon's policy and work to the thoughts and movements of his time. The notes contain abundant references to the 'Advancement of Learning' and other works of Bacon, and also to the writings of contemporary and later authors. Ample explanations are given of the peculiar constructions used by Bacon, and of the words whose meanings have undergone change.

The good paper and clear type, as well as the neat and durable character of the binding, are admirably suited to a series of students' books.

A Short History of the English People. By John Richard Green. With Maps, Tables, and an Analysis, by C. W. A. Tait. In Four Parts. London: Macmillan and Co.

There is no need now to praise this remarkable work, which by the sympathy and faithfulness of its author's method, and by the charm and brilliance of his style, has done so much in the last sixteen years to give new life and reality to the teaching of history in schools, and has leapt, one might almost say, into the position of a standard work. We take the opportunity of this re-issue in separate volumes to compliment the publishers on the happy thought which has led them to adopt a form so likely to extend its usefulness by bringing it within the reach of a larger number of students. The complete work, in one volume, is rather cumbersome and also costly for the ordinary schoolboy. Each of the separate parts may well serve for a text-book for the history classes for one or two terms in a middle-class school. Hence, the teachers of such schools will probably give a hearty welcome to the appearance of the new edition of Green's Short History.

It is a happy thought, also, to include within the covers of each part the corresponding portions of Mr. Tait's careful and valuable analysis of English History, which is not a mere summary of the text, but a supplement and guide. The periods treated in the several parts end respectively with the dates 1265, 1540, 1689, and 1873. An index is appended to each volume, and altogether no pains have been spared to make the work extremely useful. We may add that, with the least possible interference with the text, the book has been carefully and reverently revised.

Many readers who are well acquainted with the 'Short History' will turn with renewed interest to the Introduction, in which Mrs. Green gives vivid and touching reminiscences of the gifted author, whose early death closed a life of enthusiastic labour in historic fields, and extinguished the hope that his labours might result in a yet more abundant harvest.

French Passages for Unseen Translation. Higher Course, Prose and Verse. C. H. Parry, M.A. London: Rivington.

This is a sequel to the course already published. The success of the former book is well known. It is only fair to say that the more it is used the more it is liked. The book before us seems to have been compiled with the same care and judgment, and we venture to predict for it the same appreciation and success. The passages are more difficult than those before printed, there are also a large number of pieces of poetry. A student who honestly works through this little manual with dictionary and grammar by his side will be well prepared for attacking the unseens which he may meet in the examination room. Those who have the first book will be sure to buy this. Those who have not should buy both.

The Holborn Practical Readers: Books V. and VI. London: Educational Supply Association, Limited, Holborn Viaduct.

These books well deserve their name. A glance at the contents is sufficient to show their practical character, and an examination of the lessons proves their suitability for use in schools. No. 5 has lessons on natural history, thrift and temperance, health, biography and travel, moral and miscellaneous selections, and poetry. No. 6 has lessons on health and wealth, thrift and temperance, lessons from life, inventions and commerce, as well as literary extracts and poetry. The original matter is quite suitable to the capacity of the children, and the selected pieces have been chosen with care and skill. We like these two volumes much better even than the earlier numbers, which have already received commendation in these pages.

Blackie's Geographical Manuals: No. 2. For Higher Class and Middle Class Schools.

The British Empire: Part I. The Home Countries. Part II. The Colonies and Dependencies. By W. G. Baker, M.A., Lecturer at the Training College, Cheltenham. London: Blackie and Son.

Nothing in the educational world is clearer than that the day of dry-bones geography is over. Students, general readers, teachers, and examiners alike, demand that a modern geographical manual, while possessing necessarily a basis of physical facts, and statistics, shall be rendered educationally and commercially valuable and attractive by interesting descriptions, explanation of facts, bringing together cause and effect, and by showing what man has done in the world, as well as what nature has displayed.

There is no reason why geography should not be one of the most interesting of school studies. We see it at its best in such productions as those of Reclus, and any work which attempts to present the subject in an attractive garb is infinitely preferable to the dry text-books once so common.

Mr. Baker, whose geographical books we have known for many years, has succeeded in producing a very readable book. One may open the manual at any page and find something intensely interesting. Some of the descriptions read like a romance, and we only wish the geographies of our youthful days had been as attractively got up.

This geography can scarcely be called a text-book; it partakes more of the nature of a reading book. Much of it is occupied with extracts from famous writers on geographical topics, and though for some things this is to be commended, yet such a mode of presenting the facts is apt to break the uniformity of style. Between pages 120 and 180 are about a score pages of extracts. Doubtless the author hopes his readers will go to the sources mentioned for further pleasure and profit, but few are likely to do so.

The coloured maps, particularly the physical maps, are amongst the best of the kind we have seen. We are sorry we cannot bestow a like praise on the smaller maps. These are indistinct, and many might with advantage have been omitted. The only map of New Zealand is on p. 154. This is very small, and not at all commensurate with the importance of the colony. There is no map of the West Indies.

One of the best features of the book is the illustrations. These are abundant, and serve their purpose admirably. They show judicious choice. Some of them, as those on pages 111 and 127, are old friends of the boys from their favourite 'Three Trappers.'

The matter is well distributed and brought up to date. The latter is shown by the reference to the change of ownership of Heligoland and the recent arrangements in Africa.

The summaries will be very valuable, inasmuch as they present the facts in a compact form, and so aid acquisition.

We notice no typographical errors, and the printing is good and easily read. An index to both parts would be of service.

In consequence of the large amount of 'Certificate' matter inserted in this issue, we are compelled to hold over the 'Practical Perspective for Pupil Teachers,' by E. G. Baker, B.Sc., B.A., as well as many Reviews.

IMPORTANT WORK OF REFERENCE FOR TEACHERS, STUDENTS, AND SCHOOL LIBRARIES.

JUST COMPLETED.

BLACKIE'S MODERN CYCLOPEDIA OF UNIVERSAL INFORMATION.

Edited by CHARLES ANNANDALE, M.A., LL.D.,

Editor of 'Ogilvie's Imperial Dictionary,' &c.

WITH NUMEROUS PICTORIAL ILLUSTRATIONS, AND A SERIES OF MAPS.

In 8 Vols. square 8vo, 512 pages each. Cloth, 6s. each; Half Morocco, 8s. 6d. each.
Complete Work, Cloth, 48s.; Half Morocco, 68s.

The Saturday Review says:—

'Some handy form of encyclopedia has long been wanted. This is comprehensive, without being bulky. The information is succinctly given, sufficiently copious, and strictly relevant.'

The School Guardian says:—

'For the teacher a work of this kind is almost indispensable, and we know of no other that combines in so high a degree the qualities of conciseness, comprehensiveness, and cheapness.'

LONDON: BLACKIE & SON, Limited, 49 and 50, Old Bailey.

BLACKIE'S CENTURY SERIES.

Exactly Suited to the New Code.

THE CENTURY READERS.

FRESH, VARIED, INTERESTING, AND INSTRUCTIVE.

WITH NUMEROUS ILLUSTRATIONS, SPECIALLY DESIGNED & ENGRAVED FOR THE SERIES.

FIRST PRIMER, cloth 2½d.; SECOND PRIMER, cloth, 3d.; INFANT READER, cloth, 5d.

The Century Reader I., cloth boards ... ... 8d.		**The Century Reader IV.**, cloth boards ... ... 1s. 4d.	
The Century Reader II., cloth boards ... ... 8d.		**The Century Reader V.**, cloth boards ... ... 1s. 6d.	
The Century Reader III., cloth boards ... ... 1s. 0d.		**The Century Reader VI.**, cloth boards ... ... 1s. 6d.	

THE CENTURY READING SHEETS.

Consisting of the first 16 pages of the CENTURY PRIMER I., enlarged to 28 in. by 37 in., and beautifully printed on tough manilla paper. On roller, price 7s. 6d.

THE CENTURY GEOGRAPHICAL READERS.

Bright, interesting, descriptive. Profusely illustrated with Pictures, Plans, and Maps. Strongly bound in cloth.

STANDARD I.—To explain a plan of the school and playground. The four cardinal points. The meaning and use of a map. 8d. [*Now Ready.*

STANDARD II.—The size and shape of the world. Geographical terms simply explained, and illustrated by reference to the map of England. Physical Geography of hills and rivers. 10d. [*Now Ready.*

STANDARD III.—Physical and Political Geography of England. Cloth, 1s. [*Immediately.*

STANDARD IV.—Physical and Political Geography of the British Isles, and of British North America and Australasia, with special knowledge of their productions. [*In preparation.*

STANDARD V.—Geography of Europe, Physical and Political. Latitude and Longitude. Day and Night. The Seasons. [*In preparation.*

STANDARD VI.—The British Colonies and Dependencies. Interchange of productions. Circumstances which determine climate. 1s. 6d. [*Now Ready.*

STANDARD VII.—United States. Tides and chief ocean currents. 1s. 9d. [*Now Ready.*

THE CENTURY HISTORICAL READERS.

Written in simple graphic narrative. Fully illustrated with Pictures and Portraits. Strongly bound in cloth.

STANDARDS I. AND II.—**Simple Stories relating to English History.** [*In preparation.*

STANDARD III.—**Twelve Stories from Early English History.** From the coming of the Romans to the Norman Conquest. 1s. [*Now ready.*

STANDARD IV.—**Twenty Stories and Biographies from English History,** 1066—1485. 1s. 4d. [*Now ready.*

STANDARD V.—**The Tudor Period,** with biographies of leading persons. The Constitution and Functions of Parliament. [*Immediately.*

STANDARD VI.—**The Stuart Period,** &c. [*In preparation.*

STANDARD VII.—**The Hanoverian Period,** &c. [*In preparation.*

THE CENTURY ARITHMETICS.

The Leading Features of these Arithmetics are:—Exact adaptation to the Code Requirements; large number and variety of sums given under each rule; careful grading and grouping of the sums; clearness of print; lucidity of arrangement and cheapness.

STANDARD I. ... 16 pages, paper, 1d. ... cloth, 2d.		STANDARD IV. ... 40 pages, paper, 2d. ... cloth, 3d.	
STANDARD II. ... 24 ,, ,, 1d. ... ,, 2d.		STANDARD V. ... 40 ,, ,, 2d. ... ,, 3d.	
STANDARD III. ... 32 ,, ,, 1½d. ... ,, 2½d.		STANDARDS VI.-VII. 64 ,, ,, 3d. ... ,, 4d.	

The Seven Standards, complete in One Vol., cloth boards, 1s. 4d.

ANSWERS to each Standard, separately, 3d.; or for the Seven Standards complete, in cloth, 1s. 6d.

*** *Specimen Copies sent free to Head Teachers, with a view to introduction, on application to the Publishers.*

London: BLACKIE & SON, Limited, 49 & 50, Old Bailey.

J. KEEFE, F.R.G.S., F.S.Sc. (London), &c.,

63, BOLD STREET, LIVERPOOL; also at MANCHESTER.

ACADEMY for Civil Service Clerkships, Naval Cadetships, Engineer Students, Ceylon and Hong Kong Cadetships, Army Preliminary, and Factory Inspectorships; also for Banks, Business, Medical and Legal, Preliminaries, and all Professional Examinations. Over 450 successes. TUITION BY CORRESPONDENCE for Country Students.

Prospectus Free.

Post 8vo. Strongly bound. Price 7s.

CAREY'S

'GRADUS AD PARNASSUM.'

With the English Meanings. Recently Revised, Corrected, and Augmented by a member of the University of Cambridge.

London: Published by the Stationers' Company, Stationers' Hall, Ludgate Hill.

PITMAN'S SHORTHAND.

FACTS AND INDISPUTABLE EVIDENCES OF SUPERIORITY.

Over 50 years the standard and still the best.
Used by 93% of reporters in England.
Highest award wherever exhibited.
Recognised by the Education Department.
The only system that has produced certificated writers of 200 words a minute under the stringent test of ten minutes writing.

'The Phonographic Teacher,' 6d. 1,370,000 copies sold. Specimen free to Head Masters, and further information readily given. Correspondence invited. *Catalogue and testimonials free.*

ISAAC PITMAN & SONS,
1, AMEN CORNER, E.C.
BATH AND NEW YORK.

J. STROHMENGER & SONS

IRON FRAME PIANOS.

SPECIAL MODELS
FOR
BOARD SCHOOLS,
IN SOLID OAK, WALNUT OR BLACK.

Now in use at many Schools and Colleges, and giving great satisfaction.

Illustrated Catalogue and Price List Post Free.

MANUFACTORY, 169, SHOW ROOMS, 206, } **GOSWELL ROAD, LONDON.**

MADE WITH BOILING WATER.

EPPS'S

GRATEFUL—COMFORTING.

COCOA

MADE WITH BOILING MILK

J. JENNINGS & CO.,

TUITION BY CORRESPONDENCE,

DEPTFORD, S.E.

Established 1871.

Classes now forming for :—

Certificate	Matriculation
Scholarship	Languages
Sciences	Scripture
Drawing	Special Subjects

FEES QUARTERLY.

Reduction if Paid in Advance.

PUPILS MAY JOIN AT ANY TIME.

Enclose Stamp for Prospectus and full particulars.

The 'Practical Teacher' Sale and Exchange Column.

What Offers?—Popular Educator, 6 vols. (pub. 36s.); Technical Educator, 4 vols. (30s.); Abbott's Shakespearian Grammar (6s.); Lockyer's Astronomy (5s. 6d.); Smiles' Character (6s.); Southey's Life of Nelson (5s.); Barnard Smith's Arithmetic (4s. 6d.); Meiklejohn's English Grammar (4s. 6d.); Huxley's Physiology (4s. 6d.); Abbott's Via Latina; Todhunter's Euclid (new, 3s. 6d.); Dr. Smith's English Grammar (3s. 6d.); Bacon's Essays, 2 vols. (3s.); Kenilworth (2s.); Cæsar, VII. (2s.); Davies' Tudor Period (2s.); Angell's Physiology (1s. 6d.); Angell's Magnetism and Electricity (1s. 6d.) Silence a negative. Also Locke's System of Theology for 2s. 3d.; Lamartine's Genevieve, Christophe Colomb, and Jeanne d'Arc for 3s.—W. B. Wilson, Fern Cottage, Sandhurst, Berks.

For Sale.—Practical Teacher, Vol. I. (unbound, complete), 6s., free; Vol. II. (unbound, complete), 6s., free; Vol. III. (first six copies), 1s. 6d., free; Vol. IV. (two copies only), 1s.; Vol. V. (No. 6 missing), 5s., free; Vol. VI. (unbound, complete), 6s., free.—Address Alfred Goddard, Easton Royal, Pewsey, Wilts.

The Practical Teacher.

A MONTHLY EDUCATIONAL JOURNAL.

To Subscribers.—The *Practical Teacher* is published on the 25th of every month. Price 6d.; post free, 7½d.; sent post free, three months for 1s. 11d.; six months, 3s. 9d.; a year, 7s. 6d.

P. O. Orders should be made payable at Chief Office.

Subscribers not receiving their copies regularly are respectfully requested to write to the Publisher.

It would save time and expense if subscribers when remitting would state exactly what numbers they wish to be sent.

To Correspondents.—All literary communications should be addressed, THE EDITOR OF THE PRACTICAL TEACHER, Pilgrim Street, Ludgate Hill, London, E.C.

Accepted contributions are paid for within twenty-one days of publication.

TO ADVERTISERS.

Approved, *prepaid*, advertisements will be inserted in the *Practical Teacher* at the following rates:—

	s.	d.
20 words or under...	3	0
Above 20 words and under 32 words	4	0
32 words and under 64 words	5	0
For every additional 10 words...	1	0

For an ordinary page	4 guineas.
For page facing matter	5 guineas.
For 2nd page of wrapper	5 guineas.
For 3rd page of wrapper	3 guineas.
For the page opposite the 3rd page of wrapper ...	5 guineas.
For the 4th (back) page of wrapper	6 guineas.
For the half page of front wrapper	3 guineas.

Parts of a page are charged at a slightly higher rate.—Special quotations will be given for a series of three, six, or twelve months.

Teachers Advertising for Situations.

	s.	d.
20 words or under...	1	0
For every additional 10 words...	0	6

NATIONAL SOCIETY'S BOOKS FOR TEACHERS.

Revised and Enlarged Edition.

THE GRAMMAR, HISTORY, AND DERIVATION OF THE ENGLISH LANGUAGE;

With Chapters on Parsing, Analysis of Sentences, and Prosody. By the Rev. CANON DANIEL, M.A., Principal of the National Society's Training College, Battersea. 410 pp. Price 5s.

English Accidence, Parsing, Analysis of Sentences, and Syntax: being Parts I.—IV. of the above. 244 pp. Price 3s.

'Believing with Mr. Fitch that a manual of this class should be not only inductive but also deductive, Canon Daniel has supplied at the end of each chapter a selection of well chosen and searching exercises on the points treated in it. In addition the volume contains some useful features not usually met with in such works, as, for instance, the very full and interesting lists of words derived from proper names, and of words which have in process of time become so curiously corrupted in appearance, frequently from the assumption of a false etymology or false analogy, that the original forms and the etymologies are completely hidden.....The chapters on parsing and analysis are exceptionally good, and taken altogether the work will be found well adapted for the purpose for which it is intended.'—*Athenæum.*

MANUALS OF THE SCIENCE AND ART OF TEACHING:

The Teacher's Manual of the Science and Art of Teaching includes the Cultivation of the Senses, the Cultivation of the Memory, the Use of Words, Discipline, Class Teaching, Teaching by Apparatus, and the best methods of teaching Grammar, Arithmetic, Geography, History, Reading, and Writing. Price 5s. 6d.

The Advanced Manual of Teaching, which relates to the Training of Pupil-Teachers, and to the art of Teaching English Literature, Languages, Mechanics, Animal Physiology, Physical Geography, Botany, and Domestic Economy. Price 5s. 6d.

NOTE.—*The above Manuals may also be had separately, price 6d. 8d. or 10d.*

'Rules and maxims for the use of persons engaged in practical teaching may be with good effect embodied in print, as the sensible little hand-books before us sufficiently prove.....With these in hand, the young or unpractised teacher may face a class without the uneasy feeling that he is launching as it were, upon a wide and unknown sea without chart or compass.'
Saturday Review.

LOCKE'S THOUGHTS ON EDUCATION.

With Introduction and Notes. By the Rev. Canon DANIEL, M.A., Principal of the National Society's Training College, Battersea. 376 pp. Price 4s.

This is a complete Edition of the Work, and is illustrated by Passages from eminent Educationists.

'The present editor of Locke's essay has done his work thoroughly; he is a commentator of intelligence and discrimination, scrupulous as to references, and ready with all the authorities.'—*Education.*

HIGHER READING BOOK FOR SCHOOLS, COLLEGES, AND GENERAL USE.

Consisting of Nineteen Extracts from the Works of Scott, Lytton, Washington Irving, Southey, Cooper, Marryat, and other Standard Authors. Edited with Introductions and Notes, by CHARLOTTE M. YONGE, Author of 'The Heir of Redclyffe,' 'Cameos from English History.' 432 pp. Price 2s. 6d.

NOTES OF GRAMMAR LESSONS.

Being a complete Course of Graduated Teaching in the Parsing and Analysis of Words, and the Analysis of Sentences, together with a very full set of Models, Exercises, and Examination Papers. 244 pp. Price 2s. 6d.

'The "Notes" contain not only a vast amount of matter on the science of grammar, but they point out clearly and logically the method of teaching the subject.'—*Schoolmistress.*

NOTES OF ARITHMETIC LESSONS.

Together with a Graduated Course of Exercises in Mental Arithmetic, and nearly Fourteen Hundred other Original Examples. 240 pp. Price 2s. 6d.

'Admirable notes of arithmetic lessons.....It is one of the best books of its kind that we have seen for many a long day. The method of the book is that which all experienced and thoughtful teachers agree to be the right one, viz., to begin with concrete work—work done with concrete objects, to introduce gradually mental work, and to let the two kinds advance together, each interpreting the other; and lastly to introduce symbols or figures, and to work with concrete objects, mentally and symbolically, so that the full meaning of every problem shall be completely grasped by the beginner .....We heartily recommend (the Notes) to all teachers.'—*Educational Times.*

HOW TO PREPARE NOTES OF LESSONS.

A Manual of Instruction and Models for Pupil Teachers and Students in Training Colleges. By W. TAYLOR, Normal Master in the National Society's Training College, Battersea. 150 pp. Price 2s.

'Find out first all that should be taught on the subject, and then arrange your facts, presenting them in as attractive a form as possible. Mr. Taylor shows how this can be done, and we recommend young teachers to take note of his little manual accordingly.'—*Educational Times.*

THE TEACHER'S MANUAL OF MENTAL ARITHMETIC:

Being a Series of Examples, Exercises, and Specimens of Teaching, intended to show how Mental Arithmetic may be Taught in Schools as a Preparation for Formal Arithmetic. 108 pp. Price 1s. 6d.

'This is an excellent manual of Mental Arithmetic, and one in which every teacher will find many valuable hints and suggestions; which, if carried out in the daily routine of the school, will tend to create more interest in one of the most valuable mental exercises taught in an Elementary School.'—*Irish Teachers' Journal.*

PROGRESSIVE OBJECT LESSONS FOR INFANT SCHOOLS.

By W. TAYLOR, Normal Master in the National Society's Training College, Battersea. With Three Coloured Plates and Thirty-two Blackboard Diagrams. 241 pp. Price 2s. 6d.

OBJECT TEACHING FOR INFANT SCHOOLS.

By W. (TAYLOR, Normal Master in the National Society's Training College, Battersea. With Fifty-eight Blackboard Diagrams. 224 pp. Price 2s. 6d.

'Infant teachers will hail this book as a fresh delight. The thorough sympathy with child mind which it manifests on every page; the complete accord with the principles of early mental growth displayed in the arrangement and illustration of every lesson; the logical sequence observed in the grouping of lessons, all combine to make this a necessary possession of every infant teacher.'—*Practical Teacher.*

OUTLINES OF ENGLISH HISTORY,

From the Roman Invasion to the year 1889. By the Rev. Canon DANIEL, M.A. 352 pp. Price 2s. 6d.

GEOGRAPHY OF THE BRITISH COLONIES AND DEPENDENCIES.

Physical, Political, Commercial, and Historical. By JAMES HEWITT, F.R.G.S. Thoroughly revised up to 1885 by the Rev. Canon DANIEL, M.A., and others. 220 pp. Price 1s. 9d.

THE PUPIL TEACHER'S COURSE OF MATHEMATICS.

By a late Fellow and Senior Mathematical Lecturer; Examiner for the Oxford and Cambridge Board, the Cambridge Syndicate, &c.

PART I. Euclid, Books I. and II. With Notes, Examples, and Explanations. 130 pp. Price 1s. 6d.

PART II. Algebra. 130 pp. Price 1s. 6d.

'These Manuals cannot be too strongly recommended to pupil teachers and all junior mathematical students. Nowhere else can they find their wants so fully anticipated and so well supplied.....All they need do in order to avoid such mistakes as are commonly made is to study carefully the lucid explanations and wise cautions here supplied.'—*Athenæum.*

SONG-BOOK FOR SCHOOLS.

By C. VILLIERS STANFORD, Mus. Doc., Professor of Music in the University of Cambridge. The work is published in four distinct forms, as follows:—

1. The COMPLETE WORK in the Old Notation. Cloth, 144 pp., price 1s. 6d.
2. In EIGHT PARTS, intended to be placed in the hands of children. Parts I.—IV., each containing Eight Songs, price 2d.; Parts V.—VIII., each containing Eight Songs, price 3d.
3. The COMPLETE WORK translated into the Tonic Sol-Fa Notation, and edited by W. G. MCNAUGHT. Cloth, 96 pp., price 1s. 4d.
4. The TONIC SOL-FA EDITION, in Eight separate Parts, for the use of children. Price, 2d. each.

'A very charming collection of sixty-four songs of the desired quality in one, two, and three parts, adapted for the use of children.....The accompaniments are exactly what are wanting. This little work is one which should be familiar in every house where there are children.'—*Saturday Review.*

SIGHT-SINGING FOR SCHOOLS.

With the elements of the Theory of the Staff Notation on the Moveable Do System.

PART I., entitled **'Sight-Singing for Schools,'** contains Lessons and Exercises intended to enable Scholars to pass the various 'tests' required by the Education Department (Circular 219). 72 pp. Price 1s.

PART II., entitled **'The Theory of Music,'** contains Four Chapters on the Theory of Vocal Music, suited to the requirements of Pupil Teachers, Candidates for Admission to Training Colleges, and First and Second Year Students; with Specimens of Examination Papers. 72 pp. Price 1s.

The Two Parts in One Volume. 144 pp. Price 2s.

'This is by far the best manual of singing from the old notation we have seen. We cannot find in it anything but subjects for high praise.....There is a continuity that is highly commendable. Its selection of exercises and songs is as good as its theoretical explanations.'—*Schoolmaster.*

SONG BOOK FOR INFANTS AND YOUNG CHILDREN.

With Words by JULIA GODDARD, and Music by M. A. SIDEBOTHAM. Edited by Mrs. CAREY BROCK. Twenty-four Songs, cloth, 52 pp., price 10d.

SCHOLARSHIP QUESTIONS, 1887, 1888, 1889, and 1890.

With Hints and Answers to the Grammar Questions, and Full Solutions to the whole of the Questions in Arithmetic, Algebra, Euclid, and Mensuration. Price 2s. 6d. Or, the four years separately, price 8d. each.

N.B.—A Complete Catalogue of the National Society's Publications may be had on application.

NATIONAL SOCIETY'S DEPOSITORY, SANCTUARY, WESTMINSTER.

FOR FULL DETAILS OF
W. & A. K. JOHNSTON'S
WALL MAPS, WALL ILLUSTRATIONS, PENNY MAPS, SCHOOL ATLASES, GEOGRAPHICAL HAND-BOOKS, TERRESTRIAL AND CELESTIAL GLOBES, &c., &c.,
SEE THEIR COMPLETE CATALOGUE, which is sent post-free to any address.

W. & A. K. JOHNSTON (ESTABLISHED 1825),
Geographers to the Queen, Educational and General Publishers,
EDINA WORKS, EASTER ROAD, EDINBURGH; and 5, WHITE HART STREET, WARWICK LANE, LONDON, E.C.

Ready. ELEMENTARY Price 3s. 6d.

PHYSICAL AND ASTRONOMICAL GEOGRAPHY.

BY

R. A. GREGORY,

Honors Medallist in Physiography,

The Royal College of Science, South Kensington;
Fellow of the Royal Astronomical Society; Foreign Correspondent of the 'Revue Générale des Sciences.'

This work has been designed to cover the whole of the Physical Geography required by Pupil Teachers, and for the Scholarship and Certificate Examinations. In its construction the author has borne in mind the fact that Pupil Teachers as a rule do not have sufficient time to extend very much their knowledge of even the most interesting of all the sciences. He has, therefore, treated the subject in a comprehensive manner and conveyed the information in simple language. One of the most commendable features is the number of **original and well chosen illustrations,** included not for pictorial effect but **to demonstrate the facts contained in the text.** At the end of each chapter a general summary is given of the matter it contains; this summary will not only serve to call to the student's mind that which he reads in a more extended manner in the various chapters, but is intended to be a sort of **guide as to the manner in which examination questions should be answered.** Although the Physiography Syllabus of the Science and Art Department has a somewhat different range from that for which this work is intended, **there is no doubt that the student who reads and understands the subject as it is here treated is sure to obtain an elementary, if not an advanced, certificate at the May Examinations.**

☞ Next May the questions in Physiography will, for the first time, be arranged in two groups: 'one of them containing questions which relate principally to **Astronomical Geography**' (see official circular).

Mr. Gregory's Manual deals more exhaustively with that part of the subject than any other elementary text-book extant.

LONDON: JOSEPH HUGHES & Co., PILGRIM STREET, LUDGATE HILL, E.C.